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GEOGRAPHICAL DISCOVERIES IN TIBET

By the Pundit Nain Sing.

The journey performed between July, 1874, and March, 1875, by the Pundit Nain Sing, of the Great Trigonometrical Survey Department, is among the most important, as regards geographical discovery, that has been made in the present century. For the first time the vast lacustrine plateau of Tibet has been traversed by an educated traveller, who was able to take observations and describe what he saw; and thus a great increase has been made to our scanty knowledge of Tibet.

Nain Sing, a native of the mountainous district of Milam in Kumaon, is the chief among the natives trained by Colonel Montgomerie, and his travels beyond the Himalaya have won for him a place in the foremost rank of Asiatic explorers. His geographical labours were commenced upwards of twenty years ago. He was in the service of Messrs. Schlagintweit, in Kashmir and Ladak, during 1856 and 1857. He then joined the Education Department, and was head-master of a Government Vernacular School in his native district of Milam from 1858 to 1863. In the latter year Colonel Montgomerie trained him as an explorer, and he has since been constantly employed in the department of the Great Trigonometrical Survey. His famous journey to Lhasa,* in 1865 and 1866, earned for him the reward of a gold watch from the Royal Geographical Society. In 1867 he visited the Tibetan gold mines of Thok-Jalung,† and in 1873 he accompanied the mission of Sir Douglas Forsyth to Yarkand.

In July, 1873, Pundit Nain Sing set out from Leh on his final and most important journey, to cross the vast lacustrine plateau of Tibet to Lhasa, and thence to make his way down into Assam.

Nain Sing reached Tankse, near the frontier, on the 21st of July, and entered Tibet, at Chágra, as a Lama professing to be going on a pilgrimage to a temple near Rudok. At first he followed the Chang-chenmo road to Yarkand, crossing the Marsemik-la at a height of 18,420 feet above the sea, and then turned to the east by a route over the Kin-la, which is still higher than the Marsemik, reaching Noh, a small village of the Rudok district. The progress was slow, as all baggage is carried by sheep, 20 to 25 lbs. each, which are never fed, and live on the pasturage by the roadside. Yet, out of the twenty-six which originally started from Tankse, four arrived at Lhasa, having carried their loads over a distance of a thousand miles.

The region travelled over from Tankse to Noh is the northern portion of Nari, or Western Tibet. At this western corner of the plateau the road to Khotan rises to 15,500 feet in 40 miles, and then descends rather abruptly to the plains of Eastern Turkistan. Seven miles east of Noh is the eastern termination of the Pangong series of lakes, which is a hundred miles long. The Pundit determined this eastern limit for the first time; and it is remarkable that the Pangong consists of sweet drinkable water at the east extremity, while the west end is very brackish. The Pangong is the most westerly of the system of inland lakes to which the drainage of the vast river plateau of Tibet converges for a distance of 800 miles.

From Noh the road eastward over the plateau passes along a wide grassy valley, with occasional shepherd's huts, and large herds of wild asses, antelopes, and gigantic sheep (*Ovis ammon*). Large sheets of water were frequently met with, generally salt, but occasionally fed by fresh-water streams. The plateau is at an elevation of from 13,700 to 15,000 feet above the sea. This western portion is inhabited by Kampas, a tribe which emigrated from eastern Tibet about a quarter of a century ago. The Pundit describes them as fine broad-shouldered men, well armed, and dressed in sheep-skin coats, felt hats, and leather boots with curved pointed toes. They are great sportsmen, and both men and women are constantly in the saddle. Their black tents are made of yaks' hair; they manufacture a very coarse kind of woollen cloth, and live on meat, butter, cheese, milk, and a little flour to thicken their soup.

On the 17th of September, the Pundit reached the gold-fields of Thok-Daurakpa, which are not so important as those of Thok-Jalung, which he visited in 1867. There are also two smaller diggings, called Tang-jong, and Sarka-Shyar, further east, the whole under the superintendence of an officer from Lhasa, with the title of Sarpon. The whole yield of gold, about £8000 a year, is sent to Gartokh, whence it finds its way to the sea.

Continuing his journey over the plateau, the Pundit traversed elevated plains for many marches, covered with velvet turf, and frequented by countless herds of antelopes. To the south were the snowy peaks of the northern Himalayan range (Gangdis-ri), which the Pundit traced for a distance of 180 miles. The highest,

* See the Introduction to *Bogle's Mission to Tibet*, pp. cix-cxiv.
† *Ibid*, pp. cxiv-cxv.

called Targot-yap, is 25,000 feet above the sea. Our traveller was informed that to the south of the range there was a river called Hota-Sangpo, which ultimately turned north into the Kyaring Lake. At the foot of the northern slope of Targot-yap there is a lake called Dangra-yum, and on its banks is the district of Nakchang Ombo, surrounded by snowy mountains. Here there are several villages of stone houses, and barley is extensively cultivated. It is remarkable that, although this district of Ombo is at nearly as great an elevation as the rest of the plateau, it is the only place where there is any cultivation from Chabuk Zinga, at a distance of 35 marches on one side, to Lhasa, a distance of 39 marches on the other. The elevation of Ombo is 15,240 feet. The inhabitants have a tradition that many centuries ago a great and powerful Gyalpo or king, lived at Ombo and reigned over the whole of the Hor country. He was overcome by the Gyalpo of Lhasa.

Thence to the great Lake of Tengri-nor or Namchu the country is 15,000 to 16,000 feet above the sea; the drainage being from the mountains separating the plateau from the valley of the Brahmaputra, to the north, into a vast system of inland lakes discovered by the Pundit. All these lakes are new to geographers, with the exception of Tengri-nor. The largest is the Dangra-yum-cho, which is 45 miles long by 25 broad, and the Kyaring-cho is 40 miles by 8 to 12. These lakes are well stocked with fish, and frequented by myriads of wild-fowl.

The Pundit passed along the northern shore of Tengri-nor, and thence followed the track of the former Pundit of 1872* to Lhasa, which city he reached on the 18th of November. Nain Sing, owing to well-grounded fear of detection, only remained two days at Lhasa on this occasion, and went thence to the ancient monastery of Sama-yé-gonpa where the images of the temple are of pure gold, and which contains a large Buddhistic library. This is probably the Sáwe mentioned in his former account.† He continued his journey for two days down the course of the Brahmaputra, and crossed it at the lowest known point on its upper course, where it is 500 yards wide, and 20 feet deep, with a very sluggish current. He arrived at a large town called Chetang,‡ on the right bank, where there are two monasteries and 700 lamas, and here he made out that the Brahmaputra continued its eastward course for 30 miles, and then turned south-east.

At Chetang the route ascended the valley of the Yelung, a tributary of the Brahmaputra, on its right bank, which flows through a rich and fertile valley where there are fruit trees and large patches of wheat and barley. After 36 miles the Dalatang plain is reached, a grassy expanse stretching for 15 miles to the Karkang-la, a pass over the central chain of the Himalaya, 16,210 feet above the sea. Seventy miles to the south, over a lofty region, brought the traveller to the Kya-kya pass, leading down into the Tawang valley, on the southern slopes of the southern chain. Here, at Chona-jong, in the Chukhang valley, there is a great exchange mart, where the Tibetan merchants meet those from Assam. The market, at its height, contains several hundred shops. The Pundit was detained in Tawang for some months, and eventually reached Odálguri in Assam on the 1st, and Calcutta on the 11th of March, 1875.

This really magnificent exploring achievement has yielded rich and valuable geographical results. The distance from the Pangong Lake, by Lhasa, to Odálguri, is 1319 miles of previously unknown country, except for a very short distance traversed by the Pundit of 1872; 1200 miles were entirely unknown; and the whole extent was traversed with bearings and facings, 276 astronomical observations were taken for latitude, and 497 for elevation above the sea. The eastern extremity of the Pangong Lake was settled, a system of numerous lakes and rivers was discovered, the existence of the vast snowy range of the northern Himalaya (Gangdis-ri) was clearly demonstrated, several peaks were fixed, 30 miles of the Brahmaputra was discovered, and the Tawang route from Tibet to India was surveyed.

We understand that the Pundit Nain Sing is now about to retire from the public service on a well-earned pension. He has displayed qualities which place him high in the rank of geographical explorers, combining extraordinary hardihood, endurance, and perseverance, with prudence and skilful diplomacy; while his observations are remarkable for accuracy and precision. It is not often that such splendid services have been performed for geography by the efforts of one man; and the greatest scientific traveller that India has produced should not be allowed to retire from the service without some special recognition by geographers of the value of his achievements.

* See Introduction to *Bogle's Mission*, pp cxv. to cxvii. See also *Geographical Magazine* for February, 1875, p. 41.

† See *Ibid*, p. cxiii.

‡ Probably the Shotang of his former narrative, *Ibid*, p. cxiii.

THE ABBÉ ARMAND DAVID'S JOURNEY IN WESTERN CHINA.*

THE Abbé Armand David, a Lazarist missionary and corresponding member of the Museum of the Jardin des Plantes at Paris, was sent to Pekin in 1862, and during the next six years travelled into various parts of Mongolia and China within a comparatively short radius of Pekin, one of these journeys being directed towards the Alachan country, and coinciding in the main with the route followed by Colonel Prejevalsky in his recent exploring expedition.

On the completion of this journey the Abbé wished to visit Kansu and the Kokonor country, but the troubles in Western China prevented, for a time, this design from being attempted. In 1868 he left Pekin and journeyed to Shanghai, with the intention of ascending the Yang-tse and penetrating into Tibet and Kokonor, by way of Sze-chuen. At Shanghai the Abbé David met Garnier, who had just arrived thither, after having accomplished his famous ascent of the Mekong, and who gave him useful information concerning the course of the Yang-tse and the adjacent countries. The summer being unsuited for the navigation of the Yang-tse, the Abbé passed some

* From the *Bulletins* of the Paris Geographical Society, January-March, 1876. A part of the Abbé's original journal has been published in the *Nouvelles Archives* of the Museum to which he was attached, but the latter and most interesting part has not yet appeared. The account of his exploration of the Sin-Ling range in Shensi and Honan (1872-73) he proposes to publish separately.

months in Kiang-si, with the object of undertaking researches in natural history, and visiting the missionary station on Lake Poyang. The free port of Kiu-kiang, on the Yang-tse, also occupied his attention. It was formerly a place of considerable importance, but owing, in great measure, to the Taiping rebellion it has been partly deserted, and much of it is already in ruins. The Chinese say that the number of people massacred at that time was so great that the bodies completely filled one of the lakes, the circumference of which is one or two leagues. After returning to Shanghai and Ningpo, during the illness of his servant at Kin-kiang, the Abbé finally set out on his journey up the Yang-tse, and, on the 14th of October, reached Hankow, which he found was experiencing an extensive inundation. Hankow boasted a good number of European houses, but the Abbé expresses himself as convinced that Shanghai is destined to be the great commercial mart of the far East. Until a short time previously there had been a dozen French soldiers employed as instructors for the Imperial army, but they had been dismissed under plea of there being lack of money to pay them with. The Abbé remarks, *à propos* of this, that in China as in Japan, the services of Frenchmen are largely utilised in the construction of docks and arsenals, and the drilling of native soldiers. On the 16th of October the Abbé resumed his journey towards Sze-chuen, travelling by way of a system of lakes and canals which obviate the necessity of following the circuitous windings of the Yang-tse. The boats in which they journeyed were flat-bottomed, and covered with a sort of decking of planks, joined together with cords. They are propelled by sails or oars, or towed up, as occasion offers. At Lin-kuang there is a custom-house, the officials of which board all passing craft. A few days after, the Abbé David and his party had an opportunity of watching the famous custom of fishing by means of cormorants. From twenty to thirty of these birds are employed by each boat, and on being touched by a wand they dive into the stream and emerge with a fish, which they are prevented from swallowing, by a metal collar round the throat. As, however, the fish invariably get mauled in the bird's beak, those caught in nets fetch a higher price. The cormorants are very well treated by their masters; when tired they are always allowed to rest, and when not engaged in active service they are made to go through the ceremony of a bath to keep them in health.

On the 29th of October they reached Chache, where the canal ends, and where a considerable market is held. Here a *portage* was necessary to enable the party to reach the banks of the Yang-tse, where a large boat was waiting to convey them into Sze-chuen. As, however, this boat was not to start for some days, they repaired to a missionary station at King-chow. This town is walled and surrounded by a system of large canals. Its antiquity is considerable, as Confucius speaks of it as old in his day. One quarter of the town is occupied by Tatar Manchus, who were established there at the accession of the reigning dynasty, and who are all professed soldiers. All the surrounding country is a plain save to the north-west, where slight undulations and hills are visible. The building material is a grey limestone, with fossil shells in it. It is said to come from a district upwards of 200 *lis* to the south-west, while anthracite coal is brought from mountains several *lis* to the west and north-west.

The boat which the Abbé David and his party had hired proved to be roomy, and was furnished with a crew of twenty men for the voyage as far as Itchang. On one occasion, while following the ascent of the boat along the bank, six of the party, including the Abbé, got astray, through wishing to make a short cut, and disregarding the directions given them by passing countrymen. They were forced to retrace their steps, but were unable to find their boat, and after much weary tramping, night found them in a condition of extreme cold, misery, and hunger. Luckily two Chinamen, of whom they had vainly asked assistance, were subsequently struck with remorse, and having overtaken them with lanterns, guided them to the vessel, which, however, was not reached till three in the morning.

As they advanced westward the landscape improved, the hills became well-wooded, pines being abundant, while camphor and other trees appeared, and the houses were surrounded by orange, palm, and banana trees. The level of the river had now decreased between 15 and 18 feet lower than a fortnight previously, and exposed grey rocks in the banks, as well as red argillaceous formations veined with blue. On the 11th of November the first rapid was reached, and the afternoon of the same day they halted for two days at Itchang, a fair-sized town surrounded by hills. Here they took on extra hands, to aid in the ascent of the well-known rapids, which were reached in about two hours' time. The stream here shrinks to the width of between 600 and 900 feet, being confined between two rocks of considerable height, the faces of which are diversified by grottoes and cascades, and covered with luxuriant verdure. The current of the river is here slow, a remarkable fact which can only be accounted for by the depth being extraordinary. These and similar rapids prove extremely dangerous to craft, and on a single rock, near Itchang, no less than twenty-three vessels had foundered in the course of ten days, shortly before the arrival of Père David's party, while wrecks were frequently seen by them during the course of their ascent.

On the 19th of November they reached the Tsintan Rapids, which the Chinese consider to be the most dangerous of all. Two wrecks had recently taken place there, the fragments were still visible, while they learned that three years before eleven foreign missionaries had been wrecked at the same spot, and lost all their effects. A little above Quei-chow they saw coal-mines for the first time. The formations are not extensive, the coal cropping out in deposits which lie nearly perpendicular. The surrounding formations are of a reddish colour. The boundary between the provinces of Hoope and Sze-chuen was reached on the 23rd of November. A stream flowing through a deep gorge just above the village of Pei-che is the limit, which is further marked by a large boulder inscribed with an explanatory inscription.

The prevalence of the rapids here makes navigation a very dangerous matter, and not unfrequently a boat which is being towed up breaks away from its line and is dashed down stream, to the great peril of those below. One well-meaning emperor tried to blast a portion of the rocks with which this part of the river

is studded, but even then the superstition of the natives refused to allow a famous rock close to Quei-chow to be removed, believing that it would entail immediate destruction on the city. The Abbé David and his party were cordially received and housed by the French missionary at Quei-chow. The house in which they put up was, to all appearance, new, but was nearly half-eaten away by white ants, which they here saw for the first time north of the Yang-tse. The surrounding district possesses some mineral resources; salt-mines are worked at three points in the district. Galena is found in the mountains which run parallel to, and south of, the river, and which extend for a considerable distance towards Quei-chow province.

During the whole of their ascent they saw wrecked vessels at frequent intervals, a fact which proves that this great natural highway of China is not utilised for commercial purposes without considerable attendant disasters and difficulty.

The silver found here usually contains one twenty-fifth of gold, but expensive appliances are wanted to carry on any extensive operations for separating and utilising the two metals. The Abbé remarks that Yunnan is also very rich in minerals, but the crushing dues exacted from mine-works check the development of its resources.

On the 29th November they overtook the suite of a great Pekin mandarin, who was proceeding to Sze-chuen, to hold examinations for a bachelor-degree. At Wan-shyen, which was reached a few days after, the members of the party were subject to much annoyance on traversing some of the poorer streets, being abused, threatened, and even pelted with stones by the inhabitants.

An incident which occurred shortly after is worth narrating, as illustrating the indifference of Chinese to human life. A young man belonging to the crew had a dispute with his adopted father about some money, and flew into a passion, which brought on a splenetic affection, which in China is not uncommon in such cases. In his frenzy he threw himself into the river, but was eventually rescued, bound with cords, and placed, stripped, in the bottom of a boat, where he lay shivering with cold. During meal-time, however, he managed to wriggle out and fall into the stream, and was washed away before the eyes of his friends, who made not the slightest effort to save him.

On the 11th of December the party landed, and made their way to Fu-chow, in order to avoid a great bend which the river here takes. Fu-chow is a town of 4000 or 5000 inhabitants, situated on the slopes of a mountain, and at the junction of the Penshwe-ho, a clear stream which rises in Quei-chow. Here they parted company with M. Provot, who had instructions to proceed to Penshwe, though, according to all accounts, the inhabitants of the country had been showing of late hostility to Christians. The Penshwe-ho is a large stream, and navigable for a considerable distance, but it is very dangerous, and the vessels have to be furnished with a double steering apparatus, or sweeps, to admit of manageability in the rapids and other awkward places.

On the 17th of December they were rendered uneasy by the proximity of robbers, but fortunately they sustained no attack from them. The following day they reached the two towns of Chung-king and Li-min-fu, which are well-populated and rich, and are situated on opposite sides of a great river (Kia-ling), flowing from the north. Here they put up at the house of Monsignor, Vicar Apostolic of Eastern Sze-chuen, whose house contains the chapel used by the Christian community, which is here pretty numerous. The Chinese number about 500,000, and show great dislike of Christian missionaries. From the bishop and his friend M. Favan, who had lived in Sze-chuen for upwards of thirty years, the Abbé David gathered that the best field for his natural history researches would be the independent province of Mupin, situated on the frontier of Tibet, and that the way thither was by way of Chingtu-fu, the capital of Sze-chuen, to which there were two routes, by river and by land, occupying thirty and ten days respectively. The Abbé himself determined to travel by the latter, and send his effects by the former, in charge of two of the party who were proceeding to Chingtu-fu. The country round Chung-king is exceedingly well cultivated, and appears fertile; rice-fields extend up the hills in terraces, and are watered solely by the rainfall, which is here very plentiful. The climate is cloudy and foggy, the summer heat being excessive and the winters mild. The dampness of the atmosphere is, as might be supposed, very prejudicial to health, and half the population is said to be constantly ill. There is a great opposition on the part of the inhabitants to the proselytising carried on by the missionaries, and new converts soon find themselves without employment, so that the fathers are obliged to check any wholesale conversion.

On the 27th of December the Abbé David set out for Chingtu-fu, on a chair carried by three porters, while three others carried his personal baggage, and that of his Pekin servant who accompanied him. The path is a paved one about a yard and a half wide, and leads across a mountainous country. Stone arches artistically sculptured were often met with, these being generally erected by rich families to commemorate some act of private charity or some special virtuous action. At one of the inns on the road the host proved to be a great fancier of fighting birds. This taste is a general one among the Chinese, and the price of a good bird is often as much as that of a mule. The birds most in favour for the purpose are cocks, partridges, the *copsychus*, and the *suthora*. Iron appeared to abound, smiths and nail-makers being frequently seen; and on nearing the centre of the province, visible signs of prosperity among the people increased. Lung-cheng, which they entered on the first day of the year, is a very large and prosperous town, with iron-plated gates. Nakiang proved to be also a large and rich town, the articles of merchandise being much the same as those hitherto met with in the province. Fields of sugar-cane were frequently seen at this period of the journey, the plant appearing to thrive best on slopes where water is plentiful. There are three sorts of sugar-cane cultivated; the first being the larger sort, identical with the West Indian kind; the second a smaller species like *sorgho*, and apparently peculiar to China; and the third the sweet *sorgho*, recently introduced into Europe, but which the Chinese seem to use only for making spirit from. Oranges are very plentiful in Sze-chuen, and the Abbé observed that some of the trees bore what we call mandarine oranges.

On the 7th of January, the travellers entered the plain of Chingtu, which is about four or five days'

journey in extent each way. They lodged with Monsignor Pinchon, the Vicar Apostolic of northern Sze-chuen. Mupin, the Abbé learned, was only six or seven days' distant, but a valley infested by brigands lay in the way. As his boxes, which were being brought by water, would not arrive for about twenty days, he set off for a Christian college called Ho-poa-Chang, one and a half day's journey north of Chingtu. After traversing a plain, watered by numerous canals, the water of which flows chiefly from the Tibetan country of the Mantzi, they entered, about the middle of the second day, into a mountainous region abounding in coal, which is burned both in its natural state and in the form of coke. The Abbé made some collections at Ho-poa-chang, and then returned to Chingtu, observing on his return the process of the manufacture of paper and ropes from bamboo stalks, the motive power being obtained through water-mills.

The poppy has been cultivated for some years in Sze-chuen, with the consent of the mandarins, and as this crop takes up the best lands, the produce of wheat is proportionately diminished, and the cost of living heightened.

On the 22nd of February the Abbé David started for Mupin, the centre of which principality lies between the 31st and 32nd degrees of latitude. The inhabitants of the country through which he passed are a quarrelsome race, and habitually carry long knives. Their dress consists of a white or blue turban, short but full drawers, a sort of cloth round the shoulders, and sandals. After resting a day at Yuchatiou, they continued their journey towards Mupin, and on the 27th of February reached the last Chinese village, and having crossed the highest pass in the journey, about 10,000 feet high, arrived at the Christian college of Mupin at two o'clock on the following day. The college, which is under the direction of a young French missionary, was founded fifty or sixty years ago, at a time when the country was well wooded, and was inhabited solely by the Mantzi. Since then Chinese have gradually settled all over the country, and the missionaries have introduced the cabbage and potato to the great advantage of the natives.

The chief products of Mupin are certain medicinal herbs, maize, a sort of mustard-seed from which oil is made, and which is exchanged for rice brought from Sze-chuen on men's backs, and musk. The state of Mupin is one of the numerous small barbarous states into which the region between Tibet, Mongolia, and China is divided. It is very mountainous, and still fairly wooded. To the west the elevation increases, and the supply of timber diminishes. The Mantzi, in type and language, resemble the Tibetans, whose Lama religion they have adopted. They wear thick woollen dresses which they make themselves, and live in stone houses several storeys high, which one never sees in China. They breed yaks, cows, goats, sheep, and ponies. The ruler of Mupin is said to hold sway over fifteen or twenty neighbouring chiefs. From the summit of Hong-chan-tin, the highest mountain in Mupin, ranges of very high mountains can be seen to the north and the south-west, and these are both called by the name of Ta-sue-chan or great snowy mountains. The sands of nearly all the streams in Mupin as well as Sze-chuen contain gold, and in the mountains, copper, pyrites, and silver galena are found. The climate of the country is exceedingly moist, rain or snow being of almost daily occurrence.

The Abbé returned to Chingtu towards the end of 1869, having made a rich series of collections, and immediately after Christmas he set out for a fresh excursion towards Kokonor, and succeeded, after twelve days' journey, in reaching a well-timbered valley situated in that country. He has made a few geological observations, but it is much to be regretted that his notes on this most interesting journey are not fuller. He was anxious to visit a plateau lying to the north and north-west, where the flora and fauna, he was assured, were of a distinct type, but the Muhammadan rebellion in Kansu deterred him from this project. His return journey from Chingtu to Shanghai was wholly by water, and he arrived at the latter place on the 18th of June, 1870, much enfeebled in health.

FERGHÂNA.

(Continued from page 127 of our last number.)

IN an article on Kokand, published in the year 1869, in the *Russian Military Review*, it was shown that Ferghâna, taken by itself, was of no value, owing to the sparseness of its population, to the lack of industry, and to the worthlessness of the trade in the country. It was observed that within its own limits the khanate of Kokand was not a market to which it was worth while to send mercantile caravans, for that it could not support an import trade with the insignificant quantity of its own products. This was a general conclusion, after a careful investigation of the question from published and unpublished sources, and from confidential official reports and other documents. The author pointed out, however, that Kokand was of great importance to Russia as commanding the roads connecting the Russian province in Asia with Eastern China, and with Kashmir and India. But even this was going too far, and nine years ago Kokand and the general features of Central Asian geography were sufficiently distinct on all maps to satisfy all reasonable minds that the valley of Ferghâna was but the eastern outlet of West Turkistan, and that the position which really commanded the roads to China and to Kashmir was, as it still is, Kashgar. But commanding as the position of Kokand appeared to be to the military reviewer, the commercial relations with that country could not, in his estimation, be of any account for a very long time, even in the circumstance of a treaty of commerce with that country being fulfilled to the letter, and supported by all the power and authority of a vassal khan. Yet he foresaw a brilliant future for Kokand after the complete organisation of the Russian province, and the construction of proper means of communication with Russia proper, when Kokand would flourish by a transit trade, and Russia would first begin to profit by her commerce with Central Asia.

With respect to the wealth of Ferghâna and to the density of its population there has been a great diversity of opinion, even among Russians. Some have cried up the luxuriance of the valley and the prosperity of its population, representing it as a garden of Eden, a "promised land," a very paradise, in possession of everything that nature can bestow on a

country and its people, in respect also to climate and to beauty of scenery. Others, like the military reviewer above quoted, have, with marked emphasis, dwelt on the strategical importance of the situation of the valley, openly discarding the theory of its worth as a source of revenue, but dwelling on the necessity of requiring guarantees from its then Khan for the fulfilment of various obligations, and recommending the expediency of securing free passage through the country for all Russians having any business with the local population, or with people beyond the limits of Ferghâna. At the same time, while Russian writers have differed as to the "plenty," they have, as to the "peace" which has reigned in the khanate of Kokand, been all constrained, by circumstances over which they may be presumed to have had no control, to be of one mind. All those who have written on the subject have been directly or indirectly interested in Turkistan and in activity, and they continue to advocate extension of conquest. Hence some have represented Ferghâna as sure to add much to the balance of profits shown to be already derived from the Russian Asiatic province, while others have offered excellent arguments to be employed in carrying the day at the ever-prevailing military council of the Empire.

We have very recently been favoured with a French abstract in the *Journal de St. Pétersbourg* of a Russian paper on Ferghâna by a Mr. Kuhn. As giving the latest information about that country, it is exceedingly interesting. Mr. Kuhn accompanied the forces which scoured the valley, and which so ruthlessly shelled towns and villages, killing the people in the proportion of one thousand to one of the conquerors, although, to give every one his due, it must be stated, on good authority, that General Skobelef, the favoured one in the organisation of the long-contemplated campaign, never for a moment hesitated to expose his men, even unnecessarily, to danger.

From the narratives of Nazarof, and Potanin, and of others who wrote long before Kokand was either a thorn in the side of Russia or a coveted prize, it would appear that Kokand was not then a land overflowing with milk and honey, as it has been subsequently represented, for both of the above-named travellers traversed dreary wildernesses—the first on his way to the eastern extremity of the valley, and the second in approaching the city of Kokand from the Jaxartes. From Khojend, Kokand is separated by a desert, called Ha-Dervish in the time of Baber, from the fact, as related by Baber, of two dervishes having lost themselves in it, and perished, calling out "Ha-Dervish, Ha-Dervish!"* From Kokand towards Namangan, Andijan, and Margilan, there is a desert of considerable extent, and the lands along the Jaxartes, as observed by Potanin (1830), were only suited for pasturing the flocks of the nomads.* Mr. Fedchenko, proceeding south, and at only a day's distance from Kokand, reaching high altitudes with patches of cultivable soil, traversed sterile and perfectly waterless wildernesses.

The scenery in parts is indeed exquisite, but it is beautified by rich and arboreal vegetation,† only where this has been raised by the industry of man, and in the southern and south-eastern extremities of the valley‡, where at the same time the arable lands are contracted to diminutive proportions, and where the population is semi-nomadic. The city of Kokand, with its suburbs, containing 400 settlements and homesteads (the population I should say is considerably over-estimated at 100,000), occupies an irregular triangle, of which the base extends about 15 miles from north to south, and which measures about 23 miles to its apex.§ This is unmistakably a fertile and luxuriant garden, and it is said by Mr. Kuhn to be the most densely populated oasis in Ferghâna. The fruit gardens, however, occupy the greater portion of the area beyond the city walls, the remainder of the lands being sown with cotton and with cereals, of which latter the crops fall far short of the demands of a local population, whose principal diet is succulent fruit and vegetables. In consequence of this the population of Kokand are supplied with grain from the Namangan district, on the north side of the Jaxartes, where the majority of the people, though semi-nomads, have small flocks, and are obliged to eke out an existence by tilling some of the soil. A Mr. Aristof described this district in 1871 as the granary of Kokand, and as one of the most productive in Ferghâna, whereas it is now found to be the most ill-favoured.

Within the small compass of this valley there are heaped, as it were, both profusion and poverty; and with reference to Ferghâna, it may be said that on the whole it is sterile, while nature has at the same time supplied man with the means of producing fecundity. By availing themselves of these means the people have created emerald isles in a sea of desert, the disturbing element being the billowing nomads, who ranged around them even long before Hiouen-Tsang; and looking down from the elevations, one clearly discerns the streaks of glistening sand and denuded rocky formations which separate the self-supporting communities inhabiting them. Thus between Kokand and Varukh the traveller may hunger

* This was during the prevalence of a strong wind which blows at certain seasons, and which is thus described by Mr. Fedchenko:—"The atmospheric suction into the Ferghâna hollow is so strong (through the Khojend opening) that it frequently draws in the heated air generated in the sandy deserts of Central Asia. A wind called *Gharm-Sal* then blows at Khojend and Kokand, which kills the silk-worm." This wind blows almost daily at Kokand, producing a darkness, from the air being laden with fine dust. The hot winds on the Oxus at Hissar and in Khiva are called *Tibbad*. The same phenomenon in Yarkand is described by Danibeg (1795), who says, in reference to it:—"An inexplicable dust, coming no one knows from where, falls like rain, and renders this time of the year (autumn) unbearable. The dust is so dense that the sun's rays cannot penetrate it, and this sometimes continues seven or eight days."

* In Ferghâna the cultivated lands are separated from the Jaxartes by a zone of steppe, and the smaller streams are alone used for irrigation. Hence all the towns are removed from the great river, which is of no benefit to the country. Even in Khojend a bathing-house on the banks of the Jaxartes, as observed by Fedchenko, is the only sign of a concern in the big water. On the same principle throughout all Central Asia the populations of the various States are grouped at more or less considerable distances from the banks of the Oxus and Jaxartes.

† Kairagatch (*Ulmus campestris*), poplar, mulberry, willow, *djida*.

‡ The new town of Assake, founded by Hudoyar-Khan, is said by Mr. Kuhn to be the most picturesquely situated, but in Baber's time, "in all Ferghâna, for healthiness and beauty of situation, there is no place that equals Ush."

§ The city of Kokand is situated at an altitude of 1540′ approximately.

and thirst,* between Ush and Uzgend he may starve his horse, between Andijan and Namangan he may do both, between Margilan and Kokand he may do either, and between Kokand and Khojend he may perish, as did the two dervishes; while in each of those places he may taste of the most delicious fruits of the earth, and be unable to decide on their respective merits. The oases produce, in the way of fruit, cereals, vegetables, &c, uruik or apricots, peaches, pomegranates, plums, grapes, melons, pumpkins, pease, maize, lucerne, rice (as high as 4530 ft.), wheat, barley, millet, jugara (*Sorghum cernum*), madder, cotton.

In one place Baber observes that Ferghâna is a country of small extent, but abounding in grain and fruits; but at page 6 of his memoirs we find the following: "The revenues of Ferghâna may suffice, without oppressing the country, to maintain three or four thousand troops."†

Hiouen-Tsang while taking it in as an agglomeration of oases, and saying of Feihan or Ferghâna‡ that it was "rich and fertile, producing abundant harvests and a great quantity of flowers and fruit," qualified it as "a country most suitable for the breeding of sheep and horses." And it was from the fact of a nomad condition of life prevailing in the country that it attained that celebrity for its horses (argamaks) "*qui suaient de sang*" that the Chinese Emperor, Wuti, sent an envoy to Kokand, offering one thousand pieces of gold and a horse made of the same metal for one of the swift runners of the country.

The conditions of life have changed very little since the eighth century, when, according to the Buddhist traveller of that period, "the most powerful of the people engage in mutual hostilities, and remain independent each of the other. Feeling secure on account of the rivers and natural defences, they have traced the limits of their territory, and each one occupies a separate residence."

Since that remote age, it is true the Uzbegs have had periods of supremacy, during which they have settled down in more or less numerous communities, in some localities even absorbing the nomad element, and becoming Kurāmā, or a mixed race; yet while they have improved their settlements by civilisation, the communities of these sedentary inhabitants are not much more than self-supporting.

The peculiarity of Ferghâna, as of all the Central Asian States, is that, without downright prejudice of all the interests of the country and its population, it cannot support anything like a standing native army, and much less a foreign force; it could not even cover the expenses of a regular administration. A fruit-bearing province is not naturally a profitable appendage.

The military system, if any such may be said to have ever obtained in Ferghâna, has in the best of times, under the most powerful rule, always been maintained by the voluntary system.

The Khan is said to have commanded a force of infantry, cavalry, and artillery, amounting to about 30,000 men,* and it is to be gathered from all accounts that this military body was more properly a militia than a regular army, and that it was levied and maintained in the city of Kokand and in its suburbs, which formed the nucleus of the state in which alone the Khan reigned and governed, while all the other several towns with their respective districts where held in fief by so many Beks. These latter maintained no permanent forces, although they were required on emergencies to raise a *levée en masse*, or to supply the Khan with contingencies.

The population is estimated roughly, and I am informed much too highly, at 960,000 individuals, of whom exactly two-thirds are shown to be sedentary, while the remainder, or 300,000, are nomads. Yet at this rate we obtain 22 Uzbegs to the square mile, with 10 nomad Kirghiz, or Kipchaks. This itself conveys an idea of the extent of cultivated area in the valley, and the admixture of the nomad element marks the degeneracy and slothfulness of the entire population. Hitherto, it may be also noticed, the sedentary and the nomad classes have formed two hostile camps; one lived at the expense of the other, hence the country produced only sufficient for fief-holders to fatten on it after their fashion, and for a Khan to enjoy a very moderate competency, while the rustic, yielding up the greater part or all of his surplus, wanting little for himself, retained that only.

The Khan's revenue, or we should rather call it income, is said to have amounted approximately to about two and a half millions of roubles,† 315,000*l.* This is arrived at as follows:—the country yielded him 159,614½ quarters of grain, valued at 177,000*l.* (about 13*s.* 4*d.* per quarter); cotton crops and gardens yielded him 16,459*l.*; trade and commerce, 8000*l.*, the nomads being rated on their cattle to the amount of 6000*l.*

Such is supposed to have been the income of the Khan; but over and above this amount raised by laws sanctified by custom, the people were obliged to maintain their several Beks and their Beks' retainers; by these, and by the numerous other officers of the Khan, a great deal more than the above was exacted from them in various shapes; and a people, timid by nature, easily cowed by an arbitrary authority, and accustomed to live from hand to mouth, were easily squeezed, and suffered only in proportion to their very humble appreciation of their individual wants.

What, however, may have been affluence to a Khan will doubtless prove but a very short allowance to a military and civil administration dispensed according to a Europeanised system. When Russian officials begin to swarm into the valley, each one seeking to enrich himself, it will probably be found that, barring the cost of the military establishment, the two ends

* Fedchenko suffered from absence of water during some stages, and in some places he could not obtain corn or hay for his horses in the month of June; more particularly, however, in winter, the country being in a great measure occupied by Kipchaks, who do not husband the fruits of their labour.

† Those who cannot easily refer to Leyden's *Memoirs of Baber* can satisfy themselves on what the "Great Moghul" said of Ferghâna by turning to Mr. Markham's *Persia*.

‡ This country was anciently called Kuekhan, Tawan, Phohan and Pa-han by the Chinese. Klaproth, *Magasin Asiatique*, t. i., p. 82.

* Wathen, writing in 1834, from information given to him by the Mecca pilgrims, said that the then Khan, Muhammad Alí, had a force of 50,000, nearly all cavalry, and this was when he was warring against the Chinese for the re-establishment of the Hodjas, in Kashgar. This cavalry was doubtless Kipchak, and received but little pay from the Khan.

† Mr. Khoroshkin, who was killed in the late campaign, estimated his revenue at roubles, 646,000.

cannot be made to meet, even in the luxuriant valley of Ferghâna. Firstly, the nomads of the south will assuredly migrate to the valleys beyond reach of the tax-collector and *Nadziratel;* and secondly, while prices will rise, the requirements of the natives, if the country be turned to any account, will grow in proportion with the amelioration (if that is the word) of their condition, in which circumstance they will become less and less able to give to the White Tsar what they gave to their own Khan under the Shariat, and to his myrmidons under menaces.*

Kokand was visited in 1841 by Conolly, who was entrusted with letters to the then Khan of that state, as well as to the Amîr of Bokhara, by whom he was so foully put to death. Conolly's notes on Kokand do not, however, appear to have been ever published. Mr. Fedchenko alludes to a certain Seid Ahmed, a very old man, living out his days at Isfara, who was glad to see him, because he had not set eyes on a European since 1841, This old man referred to Conolly, whom he had known; and for his kindly recollection of him, Mr. Fedchenko conferred on him some marks of favour.

Baber observes in his *Memoirs* that, "among the small hills to the south-east of Asfera is a slab of stone called Sang-Aineh (the Stone-mirror); its length is about ten gez. It is in some places as high as a man, in others not higher than his middle; everything is seen in it as in a glass." With reference to this Mr. Fedchenko could ascertain nothing, although he was not far from the locality indicated, and conversed with an aged native who was steeped in the traditions of the country, and whose memory enabled him to repeat some words spoken to him by Conolly about the respective heights of the mountains of Kokand and the Himalayas. But even the very name Ferghâna is strange to the ears of the inhabitant of Kokand.

I have alluded to the amelioration of the condition of the native population as consequent on the Russian occupation of the country. Yet *amelioration* is not the proper interpretation of the process of occupation and annexation. To begin with, a heavy contribution will be laid on the country to pay the expenses of the invasion; then may come the usual exemption of the people, for a short period, from some of the customary taxation; after that, however, things will change; the spectacle of a military and official hierarchy flourishing on the vitals of the country will bring with it a feeling of depression, a sense of comparative poverty and of absolute want; an inevitable sequestration and appropriation of lands to government, the relation of servant to master arising from a foreign domination, and many other circumstances too numerous to mention, will alter the condition of the native, not improve it; his requirements will be greater indeed, but his means of satisfying them will become more circumscribed under the incubus of over-government. He will be treated by his Russian ruler not more severely than is necessary in order to extract his sting, as his country is occupied in order that the inhabitant may be rendered harmless, not more prosperous, and because it forms a strategical line of advance to the great aim of Russian military ambition in Asia.

The danger to the Russians from the fanaticism of the Muhammadan population of Central Asia is, in the opinion of many competent authorities, very much exaggerated. There is no learning among the people, and the prejudice against the Russians springs more particularly from their long exclusiveness, ignorant superstition, and barbarous jealousy—not unmixed with awe—of the wiser masters of the country. The people have no Sheik-ul-Islam, no one head of a Church which they might call their own. They all look to the Sultan of Room as their great spiritual chief; and that is looking a long way, and only to a phantom. There is, no doubt, an antipathy of race; but religious hate, fanaticism, is, as I take it, a very fluctuating feeling, which, while it may here and there have its outbursts, vanishes very quickly when the enemy is knocked on the head.

As at Tashkand, at Samarcand, and at Shurokhana on the Oxus, so in Ferghâna the people have no deep religious feeling, strengthened by the light of reason and by book-learning—no hard-and-fast principles of religion—to prevent a fusion of the Russian and the Uzbeg minds; no elements of political or social combination. In Ferghâna they are a little more ill-favoured, owing to the governing spirit of the more unruly mountain tribes; but even these are no better than the *Khalat niki** of the rest of Central Asia, as they are all contemptuously called by the Russians. I notice this fact because so much has been made of the Russian victories in Central Asia, and because it has been sought to silence objections to conquest, by setting off the aggressive Russian forces in Asia against a background of difficulty and danger.

ROBERT MICHELL.

* The Khan and his Beks usually enriched themselves thus: "The Bek 'interviews' a merchant reputed to be wealthy, and fleecing him of his goods and money, lays his contribution before the Khan; the Khan squeezes the Bek notwithstanding, and also pays occasional domiciliary visits to wealthy merchants. When these are all but ruined, the Khan and the Bek allow them to recover themselves." When the hive is again full, the honey is again taken out of it.—*Khoroshkin's Notes.*

THE FOSSIL FLORA OF NORTH AMERICA.†

AMONG the wonders brought to light by Dr. Hayden's explorations in the Rocky Mountains, not the least important are the treasures of fossil remains, including those of huge saurians and mammifers, and deposits of rocks composed of shells of remarkable kinds. The great Lignitic coal-fields, extending along the base of the Rocky Mountains, from New Mexico to Oregon—deposits without which the Rocky Mountain regions, and the great western plains at their base, would be uninhabitable—were scarcely known before the explorations of Dr. Hayden, who defined their outlines and areas, and recorded the multiplicity and richness of their coal-beds. A special branch of the researches pursued relates to vegetable palæontology, and this article is designed to furnish a brief review of what is as yet known of the North American flora.

The great primary divisions of the vegetable kingdom, as they are generally admitted now, are: 1st, The *Thallogens*, plants with mere cellular tissue, like the Algæ, or sea-weeds, lichens and fungi. 2nd, The

* Long-robed.

† From an article in the *Bulletin of the U.S. Geological and Geographical Survey of the Territories*, No. 5, 1876.

Acrogens, flowerless plants like the former, but composed of a woody tissue and of vessels; to this class belong the Ferns, the Lycopods, or Club-mosses, and the Equiseta, generally named Horsetail. 3rd, The *Gymnosperms*, or cone-bearing plants, like the Conifers and Cycadeæ. 4th, The *Endogens*, or Monocotyledonous plants, which grow and increase from the inside, like the Palms, the Grasses, the Lilies, &c. 5th, The *Exogens*, or *Dicotyledons*, whose representatives mostly compose our present arborescent vegetation. The received opinion with regard to these classes is that, in the geological succession of their representatives, the lowest order appeared first, and that, ascending upwards, the more complex and complete organizations gradually followed. Although no form of organized bodies can be recognized in the crystalline or metamorphic rocks, which form the original crust of the earth, vegetable life appears to be manifested by deposits of graphite, the origin of which is probably due to the presence of Algæ of the simplest structure, consisting of single isolated cells. These kind of Algæ live everywhere, in the hottest springs, such as in those of Arkansas, in the geysers of the Yellowstone, the temperature of which reaches 100° C. on the snow of glaciers, &c.; and they multiply amazingly fast. In some localities the water of the sea is coloured to a depth of many feet, and over a wide extent, by the presence of plants so minute that a million may live in a drop of water.

Immediately above the crystalline rocks and from the lowest deposits of the Lower Silurian, vegetable fossils appear in the form of marine plants, like bundles of filaments crushed into a black mass. Passing higher up, the forms become more distinct, but mostly remain simple, like narrow cylindrical stems without branches, and with smooth surfaces; a form which seems to indicate a simple structure of the Algæ by juxtaposition of elongated cells joined by end. In the Upper Silurian these fucoids appear diversified, bear branches, and the surface is wrinkled, and their character admits of analysis and classification. The fossil remains here increase so that a strata of shale or limestone seem locally to be a mass of fragments of seaweeds, and as these represent only the hard-tissued and more durable species, some idea of the exuberance of the marine flora in those days may be formed. The bladder-weed along the coasts, and floating *Sargassum* in mid-ocean, play a similar part in our days. The fucoids of old, some of which were of great size, though only composed of vascular tissue, and without woody fibres, foreshadowed the appearance of the coal plants, and from their decomposition have resulted the deposits of bitumen or mineral oil. From the coincidence, above referred to, of confervoid plants of simple and analogous conformation, which are now found in the hottest thermal water, it is probable that the temperature of the sea, during that long Silurian period when water covered most of the surface of the earth, either in a condensed form as fluid, or as vapour, was higher than it is now under the influence of tropical heat. In the whole thickness of the rocks formed during this long period, which in some countries, as in England, attain a thickness of 60,000 feet, no traces of land plants had been previously observed, but recently fossil remains of two species of vegetables, recognized as land plants, have been found in the Silurian formation of the Lower Helderberg of Michigan, and attests the existence of land plants, and consequently of animal life also, in the Silurian period, a fact which till now had remained uncertain.

In the whole thickness of the Devonian period, the marine vegetation is still predominant, as testified by fucoided remains profusely imbedded in the rocks, and by the most numerous and richest deposits of bitumen yet discovered. The forms recognized in the fossil remains indicate a more diversified kind of vegetation, and a more complex and perfect structure; and some have already characters closely allied to some of our time, which is explainable by the fact that marine plants are not subject to modifications, either as distinct or rapid, as those which govern the atmosphere, and therefore the types of the Algæ are preserved for a longer time, less diversified and more widely distributed than those of the land plants. The evidence of land vegetation is seen at the base of the Devonian in fossil remains of Lycopodiaceous species of the same family, and about as large as the larger club-mosses of the American woods.

From the Lower Devonian the land plants appear to increase in size rather than in number. In the Middle Devonian a few stems of Lepidodendron are recorded. In the upper part the remains of land plants become of more frequent occurrence, and represent already all the vegetable divisions recognized in the subsequent period (Carboniferous), and even more; for in the United States, at least, the Chemung period has besides species of Lepidodendron and of Sigillaria, and species of Calamites, large trunks of fossilized and solidified wood, recognized by their structure as representatives of a genus of Conifers, the *Araucariæ*. Some species of this kind still exist in the flora of our time, inhabiting the southern part of the American and the southern islands, New Holland, and New Caledonia. The presence of Conifers in the Devonian of North America is remarkable for two reasons: first, because they enter the land flora about the same time as the Lycopodiaceous species; and secondly, because, as yet, no remains positively referable to trunks of Conifers have been recognized in the Carboniferous formation of the United States.

The land flora of the Carboniferous period is known by the great quantity of fossil remains corresponding in their proportion to the prodigious exuberance of a vegetation which has furnished the compound materials of the coal strata. Among the plants the ferns are very numerous, nearly 350 species having been described by European authors, and nearly half this number as yet is recorded from the North American coal-measures. They are classed and specially defined by the forms of the fronds and leaflets and by the nervation, but it is not so easy to establish their relation to the modern species, as these are determined by the fructifications which are rarely found in a fossil state.

The first and most interesting group of these ferns of the Carboniferous measures is that of the *Neuropteridæ*, mostly representing bush ferns of great size, whose widely expanded fronds many times branching had compound leaves, with large cordate leaflets and a close flabellate nervation, their veins being either straight or curved backward to the borders, dichotomous or forked in ascending. The leaflets are in

some roof shales heaped one upon another in innumerable quantities, and in some localities, as at Pomeroy, Ohio, the roof of the coal when exposed by the miners looks like a petrified ground strewn with stems, branches, and leaflets of the same genus, without any trace of trunks. Some of the bushy stems measure at the flattened base from 6 to 10 inches in width. The family of the Neuropteridæ is the more generally predominant in the coal-measures, and there are some representatives of the family of the Pecopteridæ, though this becomes more abundant in ascending. The remains of *Stigmaria* are especially numerous, a group representing the floating stems of the Lycopodiaceæ, and having a conformation like the club-mosses of our epoch, which have creeping stems, bearing on the under side long thread-like filaments penetrating the ground, or rootlets, creeping in wet mosses or soft mud, while their fruit-bearing stems are erect, and have leaves and cones.

The Equisetaceæ, or Horsetail species, of the present time, have cylindrical articulated stems, scarcely measuring 1 inch in diameter. The principal species of this group in the coal-measures, the calamites, were trees similar in their structure, with hollow, articulated trunks and striated surfaces, but comparatively of great size, their trunks varying from 2 to 8 inches in diameter. These *calamites* had a rapid development; their stems grew close to each other, forming dense thickets like the canes of the southern swamps, which each year rise up impenetrable groves by their compact vegetation. Some other genera of the Carboniferous flora are represented by floating water-plants of comparatively small size and of more indefinite relations. These comprise the Annularia, the Sphenophyllum, and others.

A brief sketch of the flora of the Carboniferous cannot give an idea of its luxuriance and fecundity. From the immense amount of materials which it has given to the production of the coal, and from its general characters, it indicates for the conditions of the atmosphere at this period an extremely humid rather than a very warm climate. The whole atmosphere was impregnated with vapour, and, in consequence, with a proportionate amount of carbonic acid. These elements played the part then that they do now, promoting the activity of the vegetation to the highest degree, especially that of the Ferns and the Lycopodiaceæ, which by their present vegetation show their partiality for foggy countries or the shade of humid forests, and of the Equisetaceæ, which live in swamps. The ferns were of much larger size than they are now, either as bushy species or as trees. Fossilized trunks of ferns have been found in the Ohio coal-fields measuring more than 1 foot in diameter; while at our epoch, and even in the tropical regions, the trunks are rarely half as large. The stems of our present species of Lycopods and Horsetails are scarcely half an inch thick, while trunks of *Sigillaria* and *Lepidodendron* have been recorded as measuring 2 feet in diameter.

This giant vegetation was not, on account of its huge proportions, deprived of beauty; on the contrary, here as everywhere nature seems to have given splendour to its work in proportion to and as a compensation for the deprivation of animal life. The trunks of fern trees as those of *Sigillaria* and of *Lepidodendron*, of an exact cylindrical shape, and of the same size in their whole length, finely carved upon their bark in spiral or vertical rows of scars, of diversified and always symmetrical and elegant patterns, represent the most elaborate designs of architecture. They are like fluted columns of Corinthian or Doric order, covered from base to top by garlands and arabesques, and crowned by capitals of equally elaborate style. These, adorned by depending fronds of parasitic ferns, support as roofs spreading recurved branches, arches, cupolas, domes, painted by the multiple forms of fern leaves, more diversified, graceful and fair than could be by any ornamentation inspired by the imagination, and executed by the skill of the greatest painter. Under this canopy, and in this dark temple of nature, wherein, as in the great cathedrals of old, a gloomy subdued light penetrates only by bay windows, fringed and latticed by interlacing ferns and branches, the ground is strewn by vegetable *débris* entombed under mounds of verdure. Upon the wide open surface of the swamps and bogs, the vegetable life still manifests its power by extending over the whole thick carpets of water plants with the interlaced floating *rhizomas* of *Stigmaria*, over which are raised and supported groups of calamites, whose graceful branchless stems recall the forms of Moorish minarets when seen from great distances on approaching the borders of the sands. The study of the fossil remains of the flora of the coal formation has always, in fact, excited the interest of palæontologists.

From the Carboniferous period there is in this country an immense interruption in the succession of the geological formations, and, consequently, a corresponding blank in that of geological flora. The American Permian, mostly represented by magnesian limestone, has till now contributed to palæontology but a few specimens of calamites only.

The flora of the Trias is neither distinctly represented nor known in the North American geology, and the same may be said of the Jurassic, not one plant of which is as yet known in North America, though in its subdivisions it is represented in Europe by many thousands of feet of measures. It is fair, however, to presume that the essential characters of its flora consists of *Acrogens* for the land vegetation.

One of the most interesting of Dr. Hayden's discoveries should next be touched upon, and that is his discovery of the Cretaceous flora of the Dakota group. This formation covers a wide area along the Missouri and Platte Rivers, and in Kansas, Nebraska, and Minnesota, extends from Texas to the northern limits of the United States, in a width of 70 to 100 miles, and passes further north into the English North American possessions, even apparently to Greenland. Its synchronism would appear to be with the Middle Cretaceous of Europe; it is of a reddish, ferruginous, sandy shale, and vegetable remains are, if not in profusion, at least tolerably abundant, and especially in a fine state of preservation. They are mostly leaves, with a few fruits and stems, from which the relation of genuine types at least, if not of species, is ascertainable. This Cretaceous flora is known by more than one hundred species, has not preserved any of the antecedent types, not even those of the Jurassic, the immediately preceding age; the Ferns and the Conifers are few, and all represent new forms, while the flora mostly represents dicotyledonous plants, a discovery of interest, as no plant of this nature has been described in Europe as from the

Lower Cretaceous, and one only has been described in Greenland. Seventeen of the genera to which the forms of the Cretaceous leaves are referable are those to which belong the species of trees and shrubs which have at the present time the more general and the widest range of distribution. Most of the genera of the arborescent North American flora are represented in the Cretaceous, with the exception of those characterised, by serrate, denticulate, or crenate leaves. From all considerations it is probable that the climatic circumstances governing the flora of the Cretaceous Dakota group were nearly identical for the temperature, at least, with those of the North United States at the present time.

From a theoretical point of view it would seem rational to suppose that, ascending higher in the geological series, we should find a gradually closer relation between the ancient floras and that of our own time. This, however, is not the case. The Lower Lignitic flora has not as yet a single species identical with any of the Cretaceous, and even very few have a distinct relation to them. Its more essential character is marked by the presence of Palms of great size, and so abundant that in some localities they seem to have comprised one-fourth of the vegetation of that period. It is evident that at this epoch the atmosphere was highly charged with humidity, which, tempering the climate by diminishing the extremes of heat and cold, furnished the conditions of a different kind of vegetation. As in the Carboniferous, so in the Lignitic, extensive flats, wide surfaces of land slowly emerging from the sea, were for a long time under an atmosphere of fogs and vapours.

The Tertiary remains of the Rocky Mountains have been divided into four sections. The relation of the flora of the Lower Lignitic, or first, with that of our time is more distinctly marked by the Magnolias and Oaks. The flora of the second group, the Evanston or Lower Miocene, is represented as yet by about ninety species, many fossil plants of which have, for the first time, dentate or serrate leaves. The third group, Carbon or Middle Miocene, unites in its types Miocene Arctic types, from Alaska, Greenland, and Spitzbergen, with those of Middle Europe, a combination which indicates the wide extent of the thermal zones during the Miocene period. The flora of this group has some of its species scarcely different from those of our present flora. The fourth group referred to, the Upper Miocene, is a freshwater formation of laminated calcareous shale clay, more or less impregnated with bitumen. Besides vegetable fragments, especially of Conifers, the shale holds insects, feathers, skeletons, and scales of fishes. From the preponderance of Conifers and shrubs, the climate of this epoch appears to have been somewhat colder than at the former period.

In considering the distribution of the plants in the whole Tertiary of the Rocky Mountains there is evidence of a slow upheaval of the land, of a comparative diminution of atmospheric humidity, and consequently of a lowering of the temperature. During the process of formation of this fourth group, the ground had become hilly if not already mountainous or subalpine; the land was a succession of valleys, hills and lakes, the upland covered with forests of conifers, the swamps and the dales, with shrubs, willows, wax, myrtles, numerous species of holly, &c. The lignitic precedes in its formation the upheaval of the mountains, while the strata of the Green River group were deposited during the period of upheaval. The flora of this fourth group consists as yet of about eighty species, thirty-two of which are identical with species of the European Upper Miocene. Turning to more recent geological epochs, a large number of specimens, representing about forty species, have been obtained in a very fine state of preservation from the chalk bluff of Nevada county, California, referred to a Pliocene formation. Except two or three types referable to Japanese origin, they are American. A formation of apparently the same age is present in the chalk bluffs or clay beds bordering the Mississippi below the mouth of the Ohio, and its relation seems to be very marked with the present flora of the shores of the Gulf of Mexico. Other links could be added in the future, and the whole chain of evidence thus completed in regard to the development and succession of the types of the North American flora from the Cretaceous to the present time.

The great increase in the number of fossil plants from the North American formations may be seen in the facts that, in 1850, there were only eighteen known species described by Brongniart in his *Végétales fossiles* from specimens sent to him from the coal-measures by Professor Silliman, and that at the present time more than 1000 species have been described from the various geographical formations of the country.

ROQUEFORT: SHEEP AND CHEESE.

THE palm of excellence is assigned by the proverb to Brie, but by the truth to Roquefort cheese. This is a favourite quotation in Parisian hotels, and for once the waiter is right. But, while justice is done to the cheese, little is ever heard of the place, and thereby a great wrong is done to one of the most curious spots in France. It is true that Roquefort has had its historians and even its poets. Bosa threw a chapter at it, in his annals of Rouargue. The Academy of Sciences took it into quarto consideration. The names of Marcorelles, Monteil, Chaptal, Bazaraingues, Lamothe, Roche, and Bonhomme, are associated with its rock-hewn cellars; but much poring over these pedants in the National Library of Paris—which is *not* the largest in the world, as the guide-books say—I formed nothing like an idea of what I saw when on a visit to the little Larzac town, itself so obscure, yet in regular communication with nearly all the rest of the world. To begin with, you feel something like a modern Marco Polo when climbing a height which, you are told, is the "Mountain of Cambelou," and which hangs its monstrous crag right across the principal street below. I am no geologist, though every farmer here is one, or there would be an opportunity for very learned expatiation; but a reference to rock and soil must come in now and then. But what I celebrate is Cheese—the wool, the mutton, and the lamb being mere subsidiaries.

The South of France has, from immemorial time, been famous for its milk-producing sheep, and Roquefort has enjoyed for ages an unique reputation. Did

not Pliny the Elder recommend its incomparable dainties to Titus, and was not a costly trade in them carried on between Nîmes and Rome? What else could the old Veronese barrister have meant by Lozara cheeses? We will follow the example of most antiquarians, and take it for granted, without much inquiry. It is certain that, in the year 1000, the monastery of Conques prided itself upon the annual receipt of two precious "curd-loaves" from Cambalou, the villagers whereof have had, at various times, a hard battle to fight against encroachment and imitation for their fame and their privileges. Nevertheless, they have held their ground, and France, at any rate, continues loyal to Roquefort as *Roi des Fromages*. You shall hear those words every time you enter a *cave*, which does not imply, as elsewhere, simply a cellar, but the entire factory. The caverns, for, strictly speaking, such they are, though artificially enlarged and proportioned to their uses, were originally no more than accidental cavities in the stony hill, the summit and sides of which were pierced by funnel-shaped apertures invaluable to the *fromagerie*. Indeed, in these cool hollows alone can be perfected that combination of soft and yet firm substance, mottled with green and blue, most enticing and stimulating to the taste; the ornament, says Monteil, of the rich man's dessert, and the economy of the workman —because a bit of it, the size of a hazel-nut, will flavour a whole bottle of wine—renowned, emphatically, as Roquefort cheese. Their temperature is exceedingly variable, yet any attempt to regulate it would be ruinous. The secret has never been discovered. It is as if the happiest medium had been created, as the people of Aveyron, of course, declare it was, in the express interest of the cheeses. In a cooler temperature they would lose their pungency; in a warmer they would melt; in one more dry they would harden; in one more damp they would decay. I must confess that, what with the natural atmosphere, and the powerful "dairy" odours prevailing, the effect upon the head is rather like what the Princess Charlotte used to call a "dullification."

Before entering these dim recesses, however, I roved about the lofty plateau of Larzac, with its long, steep banks, small intersecting valleys, sprinklings of cottages, and universal sheep and shepherds. The animal is remarkable in appearance, with a flat and narrow breast, very poor shoulders and legs, immense sides, and a vast development of milk. The lambs are weaned so early, for commercial reasons, that they never grow into a fine form, and when sold at a certain age are worth no more than a few francs. Nevertheless, for the production of Roquefort cheese their milk is matchless. An experiment was made some years ago with the Merino breed; but it failed altogether. Few have any idea of the subtleties involved in, or of the pains bestowed upon this manufacture. It is not merely that the highland I have spoken of—pleasant and breezy, if not suggestive of any rich fertility—has been covered with artificial fields, made of carefully mingled earth, sown with trefoil, sainfoin, lucerne, and "mixed seeds;" the flocks are tended as though theirs was indeed the Golden Fleece. To them all else gives way: it is a landscape of sheep—400,000 of them, from the most bleating infancy upwards. The ground is grey with them, and, when at their prime they are worth a guinea a piece. Nowhere is the "silly sheep" so tenderly watched over; he is fed with plenty; in winter he eats dried grapes carefully preserved, and drinks water whitened with barley flour; he is taken out for an airing when the weather is fine, and coddled like a Turk when it is cold. But the summer is the grand season, though he is still under some restraints. For instance, he must finish with one plot of herbage before beginning upon another, and it is amusing to look on while he, with perhaps a hundred other greedy rebels, tries to evade the crook. The flock is never led far at a time, for fear of tiring and distressing it; no barking dog or brutal boy is permitted to frighten it; its thirst is quenched at pure pools, with "the chill taken off" by the sun; but the assertion often made that aromatic and balsamic plants enter largely into the pasturage is erroneous. I was assured that they are considered injurious, and are extirpated wherever they appear. It is not to a quantity, but to a fine quality of milk, that the cheese-farmer looks, and, as might be expected, the traditions of this industry are its laws. One is, not to let the sheep associate with oxen or goats. They are the aristocracy of Larzac, and keep other creatures at a distance.

It is milking time, morning, though it will be milking-time again in the evening. Hundreds—thousands, if you could see them—swarm in the sweet meadows, each carrying a very short-legged baby-looking stool, each catching a victim. But the pretty dairy-pail of Holland, of snow-white wood, with glistening copper hoops, is represented here by an ugly iron pot, lined with tin. Once full, it is hurried off to the farm-house, skimmed, strained, warmed to a degree according to the state of the weather, though never above boiling-point, thrown into enormous deep vase-shaped pans, and left to accumulate its cream. With a keenness of judgment only to be acquired by a lifelong, and even perhaps an hereditary experience, the dairyman distinguishes between the quality good for butter and the quality good for cheese. Then, the morning's and the evening's milk are blended, and a number of young damsels, laughing like the girls of Clusium, stir these innocent caldrons with willow sticks. After that the covers are put on, and "the mother of cheese" is left to take a little rest, not however, before the due proportion of rennet has been added. I do not feel bound to follow the entire series of operations, the breaking, the squeezing, and filtering of the curd, the moulding, milling, and draining; but was interested in what followed—the rubbing of the new cheeses with mouldy bread, which, indeed, enters into the composition of the cheese, and helps to give it the green ripeness that is essential. They are next arranged on grooved shelves to allow of whatever milk remains running off; they are turned twice a day for about a week; then they go to the drying-room, a twilight excavation among the caves of Cambalou, always facing the north, exquisitely clean, with metal or canvas blinds to keep out the dust and flies, and fitted with linen-covered shelves, where the cheeses remain kept warm by pails of boiling water in incessant relays, until pronounced ready for the cellar. But they are far from being done with yet. I may as well say a word, however, concerning the mouldy bread. The highest importance is attached to it. It is made "on the premises," from the finest wheat, or winter or March barley, with a large quantity of the strongest yeast, kneaded beyond all necessity, except in the cheesemaker's eye, baked thoroughly, deprived of its crust, pounded in a mortar,

allowed to be in a damp place until every crumb is touched, sifted, and, so prepared, it actually grows through the cheese like a plant. Indeed, the botanists have given it a name. I inquired whether it was true, as I had seen stated at Paris, that a piece of old cheese was sometimes introduced into the new to, as it were, inoculate it. The answer was, "Never! That would be ruin!" For, you see, Roquefort would be as nothing without *fromage* de Roquefort.

On the passage from the drying vaults to the cellars, the same delicate care follows the Parisian's *bon bouche;* it is packed with as much solicitude as though it were Venetian glass, in cases of special construction, and loaded in vans slung below the axles instead of above them, so that the crust may not be broken by the joltings of the wheels. And the transit must be made by night, so that the heat of the sun may not afflict these tender tit-bits. Arrived in the "scale-chamber," they are examined, like the wounded after a battle; the spoiled put aside, the rest weighed, all registered. The rejected go to the farm-proprietors, whose families do not mind eating them. But for the others, maturity has not even now been attained. They must be salted, that is, a handful of salt is spread over one surface, and twenty-four hours later over the other. Then, two days elapse, and the salt not already absorbed is rubbed in with the roughest of Dutch drapery. Another two days, and still these persecuted cheeses are upon the rack, this time under the edge of a knife. First of all, a white outer coating of glutinous matter is removed, its thickness varying with the season. There is a second scraping immediately afterwards, also white, which is eaten by the poorer classes: they say it is very tonic; I know it is very nasty. That ceremony being accomplished, the judges are called in to classify the products of the Roquefort farms. There is one of a Roman order which is above suspicion, and, therefore, not classed at all. Next come the first and the second qualities, which, like Eastern slaves, after being inspected, have to undergo a sort of shampooing, and to be dressed. They dress themselves, however. They put on a yellow, or a white, or a reddish covering of must, which is sold for a few farthings a bushel, as food for pigs; but this outburst—so capricious is the temporary Roquefort cheese—is renewed at intervals of from eight to fifteen days, and a joyous industry it seems to be. For I left the long, dull street of caverns, or rather wall-faced rocks, and, passing through the several "chambers of preparation," saw the maidens at work. They were not exactly underground, they were *in* the ground, like the Trolls of Scandinavia. They were called *Cabanères*, after the ancient designation of a Roquefort cellar, which was "cabin." And it struck me that their rock-inclosed workshops were less gloomy of aspect than that old street outside, with the awful rock overhanging, the wall-faced hill of Cambalou, the heavy, parapeted side-walk, and the sense of monotony inseparable from every French provincial town. True, the visit is something like having a tasting order for the docks—only the perfume of the place is oppressive in a different manner. Vast elliptical arches, patched with brickwork, hang over rank upon rank of interminable cheese, and flaring sconces, rather classically shaped, waver a ghastly radiance from the walls. There they sit, these daughters of darkness, singing like caged linnets, while they prepare "Roquefort" for another stage of perfection in stone pigeon-holes, suggestive of nothing so much as the catacombs of a pigmy race. They earn their board and lodging, and about 10*l.* a season salary, and they never eat cheese. I say "season" instead of year, because their engagements are for eight months only. During the other four they do needlework or assist at the farms. They are very neat in their short-skirted serge frocks, their coarse and warm woollen stockings, their wooden shoes, and their "breast-plated" aprons. I inquired as to the influence of their peculiar occupation upon their health. Translated into the vernacular the reply was "Couldn't be fresher in a field." And so it seemed.

A month or somewhat more passes over, and "Roquefort" is ready for the market. The ripest is selected, of *that season*. Last season's prime is kept, like old port, to get another crust, which should be red in colour, and, when scraped off, a luxury of the farmer's table. September is the month. The cheeses are then slightly shrivelled, pungent in taste, just what the epicurean artisan of the Fauxbourgs likes to keep a bit of, like a tobacco-quid, in his mouth, while he swallows his half-litre of wine. The distribution begins. Another packing takes place, in round wicker-baskets, willow hampers, and boxes reminding you of oranges in the outer wilderness of Covent Garden. Vain to attempt defrauding the Parisian palate—as well try to palm off oak-apples for olives. Sheep's milk is not the same everywhere, and tradesmen of a high class, in France, never dream of deceiving their customers upon the point. They announce, in their windows, *fromages, façon de Roquefort*, as who should say gilt, not gold. The true cheese, the unimpeachable and immaculate Roquefort, meanwhile, is being scattered from the humble little Aveyronnaise town, to the four winds of heaven and earth, to Antwerp and Algiers; to all curd-eating Germany; to Constantinople and Cairo; to Bucharest and Buenos Ayres, to London—too little of it—and Liliput—which is the name of a good many places in this world—to Zurich and, in the name of the Prophet! to Zanzibar. Wherefore, when Sir Hugh Evans says again to Simple, "There's pippins and cheese to come," let the response be "Roquefort."

HORACE ST. JOHN.

EXHIBITION OF SCIENTIFIC APPARATUS AT SOUTH KENSINGTON.

SINCE the first Universal Exhibition of 1851 we have had Exhibitions and Exhibitions, all more or less instructive; and doubtless, from the interchange of ideas and knowledge occasioned thereby, doing good to and benefiting thousands. Still, in the generality of cases, all the articles exhibited were new, showing the very latest improvements and perfection that the genius or handiwork of man could produce; but as to what those finished and wonderful combinations of design and skill emanated from in their first conceptions, we were left in the dark. In this respect, if in no other, the collection of apparatus now brought together at South Kensington is unique.

We cannot avoid the conclusion that we do not in

reality excel our forefathers, and that, furnished with like instruments, we could do but little. Pleased as we are to see the actual instruments with which we were familiar through the medium of books and engravings, there is still a want. On the one hand, we have the first germ or conception; and on the other, the magnificent result of that conception at the present day; but the links that connect the two are missing. If, as Dr. Hooker remarked at the Mansion House, the occasion of the opening of the Exhibition "may be regarded as marking an epoch in the history of science," and if it is indeed the nucleus of that great *desideratum* in this country, viz., a Science Museum, we shall not be extreme to mark what is amiss in the present. For we may feel assured that, when such a Museum is taken in hand, the missing links will soon be found, and many, very many, will be glad to place their treasures in such safe custody, even though they may not like to resign the right of ownership.

This Exhibition, which was so successfully opened by the Queen on the 13th May, had its origin in a minute of the Lords of the Committee of Council on Education of 22nd January, 1875, by which it was proposed to form a loan collection of scientific instruments, and a committee of scientific men was formed to organise the scheme. This committee held its first meeting in the month following, and it was decided that such an exhibition "would be most instructive and valuable."

The usual mode of dividing the work into sections, and of appointing sub-committees to work those sections, was adopted.

The sections include: 1, Mechanics; 2, Physics; 3, Chemistry; 4, Geology, Mineralogy, and Geography; and 5, Biology. Eminent men throughout Europe were invited to take part in the movement, and the invitation was most liberally responded to; the various museums gave up their choicest treasures to cross the sea, and the owners of private collections did not hesitate to lend theirs, to render the collection as complete as possible. France, Germany, Belgium, Italy, Russia, and other countries have all furnished their quota to this scientific gathering, and doubtless the United States would have responded to the call but for the claim of their own monster Exhibition at Philadelphia.

To render the collection as useful as possible, a Handbook containing notices of the several sections has been published. These notices were entrusted to eminent men in each branch of science. The articles form a most interesting and instructive book, leading up to the study of each branch in succession, and it would be well for those at a distance, intending to visit the Exhibition, to obtain the Handbook previous to their visit, as we are assured the perusal of it will the better prepare the mind to profit by the examination of the collection.

It would be almost invidious specially to name any who have been most instrumental in bringing this collection to so successful an issue, but we feel we shall detract from none in following the example of the President of the Royal Society, and commending the indefatigable labour and zeal of Mr. J. Norman Lockyer, who has had the general superintendence of the arrangements. When it is considered that the number of objects brought together is not less than sixteen or seventeen thousand, we can well imagine the labour involved in such a task.

The usual arrangement of dividing the available space into portions, and allotting a portion to each country exhibiting, has happily not been made in this collection. The objects are arranged according to a system of general classification, the advantage of which for comparison is obvious.

It is not our purpose to enter into any elaborate detail of the objects exhibited, but it would ill become a journal devoted to geography did it not notice the scientific apparatus more especially connected with the science of which it treats. We propose, therefore, in our next number to draw attention to some of the more remarkable instruments and objects used in geographical pursuits.

Among the more remarkable objects in the Exhibition are the two engines, which at once catch the eye on passing through that portion of the building devoted to applied mechanics: these are the celebrated 'Puffing Billy' and the locomotive 'Rocket.'

Near to these are the models made by James Watt, marvels of patient industry as well as of mind. In another section, lying on the floor, are the identical hemispheres of Otto von Guericke, and by their side a piece of the rope harness used for the horses, twelve on each hemisphere, that were employed in the endeavour to draw them asunder when placed together and the air exhausted within; here is also the very air-pump used to cause the vacuum. Near these hemispheres are some glass cases containing remarkable-looking instruments, the use of which we should be a long time in discovering but for the help of our catalogue. This curious-looking instrument is Tycho Brahe's quadrant, and that collection is none other than the instruments used by the immortal Gallileo himself, lent by the Reale Institute of Florence. Here is also the Newtonian telescope, Sir William Herschel's 7-feet telescope, and the astrolabe constructed for Sir Francis Drake in 1570. Among the mathematical instruments may be mentioned the two calculating machines made just a century ago for Viscount Mahon, and the more modern and better known one of Charles Babbage. The gauges of Sir Joseph Whitworth, wherewith the boring of a gun can be measured to one ten-thousandth of an inch, and his still more remarkable instrument whereby a millionth of an inch becomes an appreciable measurement, are worthy of attention.

A complete set of instruments used in observing the transit of Venus, on the 8th of December last, is interesting to those anxious to know the means by which it was effected.

In Chemistry we have Faraday's, Graham's, and Dalton's apparatus, by means of which they accomplished such wonders; the only furnace that has melted platinum, and the first sun-pictures of Daguerre. But were we to attempt to record a tithe of the remarkable objects, our article would be too long, and we must content ourselves for the present with such as we have noticed, impressing on our readers the advisability of not letting the opportunity pass of seeing this collection; for, as a matter of course, although the present assemblage may prove the germ of a Science Museum that will be in our midst, many of the objects must be returned to the museums,

the custodians of which have so generously entrusted them to our care.

Papers are being read at the Conference Meetings on the subjects of the separate sections by most able men; and if the idea, which has been mooted, of a course of popular lectures being delivered in the evenings, relating to the objects by which the audience will be surrounded, is carried out, it will greatly add to the instructive interest of the collection.

MAPS.

The collection of maps exhibited at the South Kensington Museum is neither large nor complete in any single department, but it contains much to interest geographers and the public at large. One of the most valuable contributions has been made by the Royal Geographical Society. The original manuscript maps of Dr. Livingstone, Burton and Speke, Petherick, Grant, Sir Samuel Baker, Stanley, and G. H. Hayward, are full of interest, and should be looked at carefully, for several amongst them have not been published in the shape in which they are now presented. As an instance we may mention Sir Samuel Baker's map, which makes the Mwutan Nzige to be only thirty miles across near Magunga, whilst the distance on the map published is nearly double. The Arctic maps, too, are sure to attract attention at a time when two of H.M.'s vessels are on the road to the North Pole; and the huge diagrams ordinarily used at the Society's meetings do not merely hide what would otherwise be bare walls, but illustrate the progress of some of the more recent exploratory journeys. The Secretary of State for India exhibits a judicious selection of maps to illustrate the progress of cartography and of surveys in India, and in the countries connected with it. The most ancient of these maps are plans of Bombay and Karanja, extracted from Antonio Bocarro's book, published in 1648; the most recent brings us down to the present year. Geographers cannot fail to inspect with interest James Rennell's Bengal Atlas or his map of India; and they will be pleased with the progress which has been made since that time in every respect, for the surveys now carried on in India are based upon a triangulation, conducted with the same care as those of European countries, and although the details of the topographical or cadastral (revenue) surveys may not be quite as exact in every respect as those of the Ordnance Survey, and their reproduction, by photozincography from the original drawings, may leave something to be desired, they answer every useful purpose, and no country of similar extent outside the limits of Europe, not even the "Old Dominion" in North America, can boast of the possession of maps equally trustworthy. Admirers of draughtsmanship should examine No. 18 (Captain Robinson's map of the districts of Jhelum, Rawalpindi and Shahpur), and compare it with the lithographed copy at the side of it. India surveyors do not however confine themselves to the limits of India proper. This is proved by Colonel Montgomerie's Trans-frontier maps, which embody the results of the explorations carried on by Europeans and Asiatics, and by Major St. John's important map of Persia, a full notice of which we must postpone for the present.

The Hydrographic Office of the Admiralty has lent a large number of representative charts and plans, the prototypes of all similar publications throughout the world. In addition to these, there is a most interesting collection of original MS. journals and log-books, which should be looked at with reverence, for they contain the results of the labours of several of our most celebrated navigators, including Dampier, James Cook, Bligh, Sir John Franklin, and Sir Edward Parry.

The collection of maps lent by the Ordnance Survey, now conducted by Major-General Cameron, enables us to form a fair opinion with respect to the manner in which their grand work is being carried on. There can be no doubt that the survey of the United Kingdom is being conducted with greater accuracy of detail than that of any other country, and that the results are being published on a scale and with an attention to technical perfection unknown elsewhere in so vast an undertaking. These facts may console us somewhat for the slow progress that is being made. The map of part of Scotland, with hill features engraved, will repay careful examination. That officers of the Royal Engineers have been, and still are, engaged in surveying operations in other parts of the world is brought home to us by Major Wilson's maps of Jerusalem and Mount Sinai, and by several sheets of the ordnance map of Palestine (in manuscript), which is being conducted at the expense of the Palestine Exploration Fund. We hope this proof of progress will not fail to impress the public with the necessity of contributing towards the funds of the institution, if the work is to be brought to a satisfactory conclusion.

The only foreign Government Survey offices which have contributed towards the exhibition are those of Prussia, Hamburg, and Norway. The latter merely exhibits photographs of two plane-table sheets, illustrative of the manner of contouring the hills, but Prussia makes a fine show. Its principal contributions consist in a large map of East Prussia, and in another of Nassau, both on a scale of 1 : 100,000, which is hardly more than half that of the one-inch Ordnance maps. The map of Nassau, though by far the more interesting of the two, for it is full of hills, is unfortunately hung so high as to defy inspection. The visitor will therefore have to confine himself to an inspection of the map of East Prussia, and to some others of the uninteresting country around Berlin. He cannot fail to be favourably impressed, although, from an artistic point of view, the Prussian work is certainly inferior to that produced at Southampton. This is due, however, not so much to inferior workmanship, as to a different manner of treatment. On the Prussian map the lakes, rivers, and boundaries are tinted, woods of deciduous trees are distinguished from coniferous woods, and the character of the roads is shown distinctly, if not offensively, by conventional signs. Features such as these may add to the usefulness of a map, but they are disturbing elements, and, together with the colouring, they mar the beauty of a black copper-plate impression. Let the sheets of the Ordnance Survey be treated in a similar manner, and the result will be very much the same. The plan of Hamburg published by the Board of Works of that city deserves notice for its abundance of detail and fine execution.

The number of private exhibitors is exceedingly small, and England can hardly be said to be represented at all. Nor is this to be wondered at, considering

that an intention of combining an exhibition of maps with an exhibition of scientific instruments was never made known to the public at large. Germany is represented by Reimer of Berlin, Friedrichsen of Hamburg, Fischer of Cassel, and Homann of Nuremberg. The latter, probably one of the oldest geographical firms in the world (it was established in 1702), is represented by a map of the hop-growing districts of the world. Reimer exhibits Kiepert's physical wall-maps and globes; Fischer, a few school maps; Friedrichsen, a map of Costa Rica, &c. France is represented by Erhard, Delesse, and a few others. Amongst the relief-maps, that of France by Levasseur and Mdlle. Kleinhans is certainly the one sure to find most admirers. Dr. Hector has lent a relief-map of New Zealand, roughly executed, but evidently based upon great local knowledge, and conveying a capital notion of the nature of the country. There are other maps of this class in the Exhibition which are beneath contempt, and we hope the Kensington Museum authorities will not even accept them as a gift should they be offered to them. There cannot be the least doubt about the usefulness of relief-maps. But it is essential that the persons who devote themselves to this branch of cartography, should possess an adequate knowledge of the countries they undertake to portray, and sufficient skill to mould the clay in accordance with this knowledge. The heights must be exaggerated, except in the case of maps on a very large scale; but there should be a limit to this, for, by piling thirty Himalayan chains one upon the other, we distort and even obliterate the orographical features to such an extent as to produce a wretched caricature instead of a striking portrait. Relief-maps, moreover, should in every case be treated and coloured as physical maps, and if we would do this we must take some notice of the sphericity of the earth. Mdlle. Kleinhans's fine model, we have no doubt, would please even more had she not confined herself to a correct reproduction of hills and mountains, but had likewise taken notice of the most striking features of all—the sphericity of the earth's surface.

Amongst minor articles exhibited are two maps of the earth, by G. H. Darwin, the one projected on a regular dodecahedron, the other on a regular icosahedron; a diagram showing the amount of the misrepresentation of the sphere by plane maps, by C. W. Merrifield; and a set of stereoscopic maps taken from models in relief, by Francis Galton.

The number of geological maps and models is large, and fills nearly half the room. Side by side may be seen William Smith's first geological map of England (1790—1815), Greenough's map (1819), and the maps and sections resulting from the exact surveys now being carried on by the Geological Survey of the United Kingdom. Amongst British Colonies only Canada, New Zealand, Victoria, and Queensland are represented. The only foreign governments which have contributed are Prussia and Bavaria. A model of the Cleveland Ironstone district (by John Bell) will attract attention on account of its vast size; an-another of Mount Etna, by Beck, on account of its subject.

E. G RAVENSTEIN.

SUB-LIEUTENANT GEORGE, R.N.

IT is with great regret that we have to report the death of Navigating Sub-Lieutenant Charles George, R.N., a surveying officer of great promise, and son of Staff-Commander George, R.N., the respected Curator of maps to the Royal Geographical Society, and himself a distinguished surveyor. Young George, like his father, was trained to the surveying branch of the naval service, and joined the Indian Marine Survey Department, under Captain Taylor, R.I.N., in November, 1874, as Assistant-Superintendent. This year he was serving under Navigating-Lieutenant Jarrad, in the steamer 'Clyde,' surveying the approaches to Rangoon, and proceeding afterwards to Akyab, where Mr. George was suddenly attacked by cholera, and died on the 31st of March, 1876. He received every kindness and attention from Lieutenant Jarrad, and from Dr. Armstrong, but the fatal disease could not be checked.

The loss of this young officer will be seriously felt by the Department in which he was doing most excellent service, and where he had won the warm friendship of all his brother officers. Captain Taylor speaks of him as a painstaking and intelligent surveyor, and a general favourite; and adds, that the Department will feel his loss, as it will be difficult to replace such a well-trained surveyor, good officer, and thorough gentleman; and Captain Ellis has written in similar terms of his lost friend. His career was brief, but it was one to which his bereaved father can look back with pride, as that of a young officer who always strove to do his duty thoroughly and well, and succeeded.

Reviews.

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CHILIAN HYDROGRAPHY.

THE Chilian Government has taken the wise step of establishing a Hydrographic Office. By a decree dated May 1st, 1874, it was declared that the duties of this department would be to report the surveys that should be undertaken; to prepare instructions for surveyors; to publish charts; to superintend the registering of meteorological observations on board Chilian vessels; to issue charts and hydrographic notices, and to publish notices respecting light-houses and buoys; to prepare statistics of wrecks and accidents at sea; and to bring out a yearly volume, entitled *Anuario Hidrografico de la Marina de Chile.**

The first director of the Chilian Hydrographic Office is Captain Don Francisco Vidal Gormaz, an able and energetic surveyor, whose hydrographic labours on the southern coast of Chile we had the pleasure of noticing in a former number.†

The first *Anuario Hidrografico*, a handsome volume of 469 pages, with numerous maps and charts, was published under the superintendence of Captain Vidal Gormaz in 1875. It contains the record of much important surveying work, which redounds to the credit of the gallant little Chilian

* *Anuario Hidrografico de la Marina de Chile, publicado por la oficina respectiva. Año* I. (Santiago de Chile, 1875.)

† See *Ocean Highways* for May, 1873, p. 73.

navy. The first narrative is that of the survey of the Chonos Archipelago and adjacent coast, by Captain Don Enrique Simpson, on board the corvette 'Chacabuco,' in 1870 and 1873, with botanical and other appendices, a complete meteorological register, and charts. The second report is by Captain Vidal Gormaz, on the survey of the Maullen in 1874, an important river in the south of Chile, which drains the Lake of Llanguihue. Unfortunately the rapids prevent its navigation to the sea, but there is a good cart-road to Port Montt, for the conveyance of the produce of its valley, where several English and German settlers have large wheat and vegetable farms. The third report is on two isolated islands, called San Felix and San Ambrosio, off the South American coast, in 26° 19′ S. These islands, formerly called "Las Islas Desventuradas," were discovered in 1574 by the pilot Juan Fernandez, the famous navigator who first showed the course to be taken in a voyage from Peru to Chile against the south wind.* In 1789 these islets were visited by the Spanish frigate 'San Pablo,' and in 1793 by the English whaler commanded by Captain James Colnett, who landed with great difficulty. Subsequently Dumont D'Urville touched at them, and Du Petit Thouars in the French frigate 'Venus,' in 1843. Don Leoncio Señoret, in the Chilian schooner 'Colocolo,' was at the islands in 1841, Lieutenant Parkins of H.M.S. 'Portland,' landed on San Ambrosio in 1850, to see if there was any guano, and Captain Simpson of the Chilian corvette 'Chacabuco,' was there in 1868.

The survey of San Felix and San Ambrosio was executed by Captain Vidal Gormaz, in the gunboat 'Covadonga,' in 1874. His report is an exhaustive monograph on these little known islets, with botanical and geological notes and illustrations.

The *Anuario* also contains detailed notices of recently discovered or surveyed rocks, islets, and banks, sailing directions for the coast of Chile, reports of wrecks and other casualties, with a wreck chart, lists of charts published and sold by the Chilian Government, and useful tables. The charts are very creditable specimens of lithography, executed at Santiago. The Chilian Government, by the establishment of a hydrographic office, and the annual publication of the reports of their surveyors, are doing excellent service to geography. The first volume of the *Anuario Hydrografico* is a valuable and very interesting work, and we may confidently look forward to the annual appearance of equally meritorious work, under the able superintendence of Captain Vidal Gormaz.

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THE LAND OF THE WHITE BEAR; being a short account of the 'Pandora's' voyage during the summer of 1875. By *Lieutenant F. G. Innes-Lillingston, R.N., F.R.G.S.* (Griffin, 1876).

LIEUTENANT LILLINGSTON has done well to publish, we believe at the request of Captain Allen Young, his pleasantly written narrative of the cruise of the 'Pandora.' It, of course, goes over the same ground as Mr. MacGahan in his larger volume, but, nevertheless, we think that those who are interested in Arctic matters will be glad to have the story of this interesting and adventurous voyage told by a sailor. The little volume contains several excellent illustrations, and a good map.

* See *Navarrette Bibl. Marit. Esp.*, ii., p. 229.

CLOUDS IN THE EAST.*

THIS is the somewhat fanciful name of a book which, as may be learnt from its title-page, purports to be an account of travels and adventures on the Perso-Turkman frontier. The writer after some thirteen years passed in a Hussar regiment, found himself with a little time at his disposal. Instead of dangling about between the clubs and the Horse-Guards till fresh military employment offered, he determined to devote his leisure to useful purpose. Russia had planned an expedition against Khiva, and her rapid conquest of that Central Asian oasis had attracted considerable attention in England. Lord Granville and Prince Gortschakoff having discussed nice questions of geography concerning certain districts of Afghanistan, of which nothing was in reality known but the names, the Russian Foreign Office had adroitly acquiesced in the English demarcation of the Afghan frontier. For obvious reasons it mattered not to Russia where the frontier line of that unvisited region was fixed, as long as the border between her recently acquired dominion on the Lower Oxus and Persia was left in a fog. In England we had no trustworthy information of this border-land, and our Foreign Office seemed in no way anxious to possess any. The author was thus desirous of "penetrating the mystery that hung over those Eastern deserts, and so bring back information that might be valuable." In this laudable design he has so far succeeded that these travels contain records that may prove useful to geographers, and which will certainly be appreciated by gentlemen desirous of making the acquaintance of the wild ass, the ibex, and the moufflon of Northern Persia. For Mr. Baker is evidently a keen sportsman as well as a hardy traveller. But since, of Eastern deserts, he rode across only the northern fringe of but one, and that the Salt Desert of Khurasan, over which no sort of mystery hangs, it may be said that, with one exception, which we propose to indicate hereafter, he has left every geographical uncertainty in the regions he visited, whether of river, mountain, or desert, much in the same state he found it. The writer was accompanied by two friends. One of those had to be left behind on account of illness near Tehran. The other, alluded to as G—— throughout the narrative, but whose name and profession are given in full in the first chapter, and who appears to have been specially qualified for the arduous work of taking surveys and observations at all hours and in all weathers, accomplished the entire journey. But not exactly without accident. For being the hero of the only really perilous adventure the travellers seem to have met with, it so happened that he came to be wounded. As he was descending a steep hillside, his gun slipped, loaded, from the spot where he had momentarily rested it, and so sliding down, muzzle upwards, it exploded, and lodged a charge of shot in its owner's legs. The result of this untoward accident was fortunately not more serious than a few days' enforced rest.

The expedition left England in April 1873, and travelling *viâ* Vienna, Constantinople, Trebizond, and Tiflis, it arrived in the course of a month at Baku, on the Caspian. Near Baku, across the bay, are the

* *Clouds in the East*, by V. Baker. London (Chatto & Windus), 1876.

naphtha springs, and these were of course visited, and the travellers set the Caspian on fire by means of a lucifer match. The flames enveloped a boat, in which were the children of the governor of the town. What became of the children is not stated, but we may hope from the author's remark, that "the boat was not seriously burnt," that they were neither roasted nor drowned. As so little is known in England of these springs, and the curious phenomena to which they sometimes give rise of acres of waters burning like an American prairie, and which recall Moore's lines,

> "From Badku and those fountains of blue flame
> That burn into the Caspian."

Some further mention than the author gives of the accounts written of their appearance by travellers of former days may not here be out of place. The traveller Bell wrote in 1715: "In the neighbourhood of Baku are many fountains of naphtha; it is a sort of petroleum, of a brown colour and inflammable nature. The Persians burn it in their lamps." An ambassador of Her Imperial Majesty Elizabeth Petrowna of Russia, sent in 1746 on an embassy to Nadir Shah, says of the naphtha of Baku: "The Persians load it in bulk in their wretched vessels, so that sometimes the sea is covered with it for leagues together. When the weather is thick and hazy, the springs boil up the higher, and the naphtha often takes fire on the surface of the earth, and runs in a flame to the sea in great quantities to a distance incredible." In 1743 an Englishman surveyed the coasts of the Caspian, flying the while the British flag at the mast-head of his little vessel. In his chart he designates a spot close to Baku "the everlasting fire."

The Governor of Baku informed the travellers of the recent development of the springs, which has led to the naphtha being now burnt in the place of coal on board the Caspian steamers. Embarking at Baku, the Island of Ashurada was reached on the third day. This is the chief Russian naval station of the Caspian, and it is distant some 7 miles from the mainland. From the author's account it can be no agreeable place of residence. The Russian officers quartered there appear to pass their time in playing cards, falling sick, and dying. The Englishmen were desirous of going up the eastern shore of the Caspian, to visit the Atrak River and Chikishlar, but the Russians raised grave objections to such a plan. Finally, however, the good-humoured persistency of the writer prevailed. In the meantime a visit was paid to Astrabad, the chief city of Mazanderan. A Russian gentleman, to use the military language of the author, was "told off" to accompany the party. He proved on acquaintance a most agreeable person. After a few days it was discovered that M. Marquis, the name by which all addressed him, was a *sobriquet*. This word, by the way, is mis-spelt *soubriquet*. At Astrabad the travellers went out shooting, but returned "utterly disgusted." Outside the town some 3000 Persian troops were encamped. A disclosure of the relations existing between the Persians and the Turkmans settled within the dominions of the Shah is obtained when we learn that these troops were a little army of tax-gatherers. They were about to proceed to the Gurgan River, to collect the taxes from the Turkmans settled on the banks of that stream. This seemed to offer a good opportunity of visiting a territory that Mr. T. Wheeler, in his memorandum on Persian affairs, has well described as one of "the debatable lands" of that region. But neither the Russian agent at Astrabad, nor the Governor of the town, approved of the Englishmen accompanying the expedition. So they had to be satisfied with a hawking excursion to the banks of the Kara Su. On the ride back to Perivale, on the Caspian, where a boat awaited them to take them over to Ashurada, various mishaps occurred. Some rode too fast; others too slow; and some lost the way. On this Mr. Baker "gave a long lecture on the folly of not keeping together when in dangerous parts of the country." From Ashurada, the mouth of the Atrak was visited. The little schooner, kindly lent by the Russians for the purpose, drew but 6 feet, and yet had to stand off a long way from the coast, the shore shelving so gradually. Turkman tents were sighted, and the mouth of the Gurgan was passed. Of this stream we should have been glad of some more precise information than that given in these travels and in the strategical report accompanying, and to learn to what extent, if any, this river is navigable. The Russians communicate with the Turkmans on shore by firing a gun. If the latter do not at once push off in their boats, the Russians show they do not like being kept waiting by treating them with a shotted gun. The Atrak, we learn, runs into a broad backwater; this has but a narrow entrance over a bar that has only 2 or 3 feet of water on it.

Chikishlar, whence Markosoff's column started for Khiva, but which was beaten back, not by the enemy, but by heat and thirst, is but a breastwork of sand, inside of which were squatted some Turkmans. A Turkman tent costs about 5*l*., and it is, says the author, "the most comfortable migratory dwelling that man has yet devised." No doubt this tent is admirably adapted for the country where it is in use, but it is probable that the Prince of Wales and his suite were accommodated on his recent tour with tents that might vie in comfort with even a Turkman's. From Karatepe, on the Caspian, the travellers rode post to Tehran. The last stage of this ride rejoices, in the author's text, in the name of Boomahoo. This sounds more like the name of a village in the dominions of some Central African potentate, than that of a village in Persia. It is, no doubt, intended for the Baumein of Burne's travels. This is the author's account of his arrival at the capital:—

> "At last we saw the walls of Teheran before us, and passing through a high gateway, where some sleepy-looking Persian soldiers were on guard, entered the town. It was the middle of the day, and no one was about. We had left Gerome far behind, and could not find our way. In the distance, however, we caught sight of a building that towered above the rest, and looked the most important edifice in the town. 'That must be the Shah's palace,' said I, 'we shall get some information there;' and we went towards it."

This proved to be the British Legation, but, as it was midsummer, the minister and his suite were in *villegiatura* in the shady groves of the gardens at Gulahek. Here, writes Mr. Baker,

> "I was most kindly received by the Minister and the Secretary of Legation. It seemed quite strange to sit down again, dressed as in England, to a good civilised dinner, and with English faces around us. The next day I literally revelled in rest. I sat in the large Indian tent, surrounded with copies of the *Times*, and read up all the back news, enjoying myself thoroughly in so doing."

A stay of a month was made at Tehran. Horses had to be bought and servants engaged. This done, a fishing excursion to the Lar River, in the mountains near Tehran, was organised. A great many trout were caught, and later on, in the higher mountains, ibex and moufflons were seen, and some few shot. The Lar was followed to Amol, where, as so frequently happens with Persian rivers, it appeared but an insignificant stream. In the neighbourhood of this town the Caspian was sighted. A part of the way was then travelled that had been passed on the ride between Karatepe and the capital, but from Zirab the party struck eastwards, across a little-known mountainous region, finely clothed in parts with forest. This was traversed till Damghan, on the high road between Tehran and Mash-had, was reached. But, before the author and his now only one remaining companion arrived there, two interruptions had been met with on the way. One was evidently attributable to their having been so incautious as to place some 11 miles between themselves and the servants in charge of the baggage. The other arose from a misunderstanding with some villagers with reference to two ponies that had been hired of them. Of these spirited affairs Mr. Baker has been at the trouble of giving his readers coloured illustrations. In one, a gentleman riding barebacked is cantering up to a group of very black men, in the dress, or rather in the undress, of the coolies of Southern India, people who bear no sort of resemblance to any yet heard-of inhabitants of Persia. In the second picture the villagers look rather more like Persians. At the head of one of these a horseman is pointing his gun, while other villagers, squatting behind some rocks, are engaged in taking aim at the group with their matchlocks.

No road is better known in Persia than the one travelled from Damghan to Mash-had. With the scorching sun of a Persian summer in their eyes, the arid salt desert on their right, and on their left rugged, sterile mountains, whose further slopes, clothed with forest, were never even sighted, the ride was one to try the stoutest. Thousands of pilgrims, visiting the holy shrine at Mash-had, pass annually along this way, certain portions of which are open to the attack of the marauding Turkmans, whose approach, or whose reported approach, causes the wildest panic in the caravan. Towards the end of September the party arrived at Mash-had. Here the author fell sick. During sleepless nights a tempting voice seemed to say: "Return while there is yet time, and reach the Caspian. Sea-air can alone save you. Why rush to certain death? You are not on duty. You are merely trying to carry out a useful work for your country. Will your country ever thank you for it? Back to the Caspian while you can still move." Nightly counsel as peremptory as this, although seeming only to be given, must have been especially unpleasant, and would have thrown a damper on the spirits of most men. We were happy to read it had no effect on Mr. Baker. He proceeded onwards and reached Sungbust, 27 miles beyond Mash-had, on the road to Herat. Here, as it seemed useless to expect admission into Herat without an order from the British Government, which the author had not in his possession, it was decided to return to Mash-had. From the foot-note on page 175, it does not appear that the absence of this order was in any way the result of negligence on the writer's own part; but it being refused at all by an Afghan Prince ruling that territory, quwhich the few English officers who have hitherto visited it have always been welcomed, affords ample proof of the unsatisfactory manner in which our relations with the Afghans have been conducted of late years. During the last three days at Mash-had a dysenteric affection, from which the author had suffered, yielded to a Persian remedy. This is described, and it appears so simple, and proved so efficacious, that it deserves the notice of eastern travellers.

With the departure from Mash-had, by far the most important part, from a geographical point of view, of these travels commenced. It is unfortunate therefore that only 100 pages of the 328 which contain this narrative of travels on the Perso-Turkman frontier, are devoted to it. We make out this portion of the journey, till the travellers arrived again at Sháhrúd on the high road from the capital, occupied rather under six weeks, including halts. Kelat was visited, of which the writer says it may be reckoned one of the wonders of the world. It is a cyclopean fortress, hitherto but rarely visited by Europeans, and its description in these pages is worth reading, so curious and so grand is the construction of this fort. There is no more interesting part of Persia than the mountainous region traversed after Kelat had been left behind. Kurdish tribes are largely settled here, transplanted from Western Persia by Shah Abbas, to act as buffers between the Persians and their troublesome neighbours, the Turkmans. We have but brief space to allude to the only important geographical fact in regard to this little-known territory, recorded for the first time by the author of these travels. Between Mash-had and Kelat, he says he crossed the Kuren Dagh Mountains, ranging 8000 to 11,000 feet high. The altitude of the pass by which this range was crossed only appears in the map. There it is given at apparently 6300 feet. It is at the northern foot of these lofty mountains that Kelat lies. Beyond are the wide-spreading plains of Turkmania stretching away to the Oxus. The Kuren Dagh Mountains, running W.N.W. to E.S.E., and sometimes almost N.W. and S.E. at so great a height as that stated, are a new feature in a Central Asian map. These mountains appear to form an immense rampart facing N.E., and from a height ascended near Bujnurd their towering summits were clearly traced to Kizzil-Arvat, a familiar name in the blank wastes east of the Caspian. The maps of all this country, with which the travellers had been provided—the very latest productions of our topographical department—had to be thrown aside as entirely incorrect. The writer says that on recent Russian maps the Atrak is made to rise at Deregez. The stream coming from that direction is in reality not the Atrak, but the Chirinchi of the text, and the Shirinchai of the map. When the author says this so-called Atrak of the Russians is marked by them as their boundary, and thus a large portion of Persian territory appropriated, it is to be presumed he objects to any river in this locality being made the boundary, since the true Atrak, rising near Kuchan, and considerably to the south, would have added, had it been selected as a frontier, a considerably larger portion of Persian territory to the Russian dominions. The only consolation at present, in regard to Russia's advance towards the slopes of the

Kuren Dagh is that, at all events, at the date of these travels no Cossacks were met with in this northern portion of the Atrak valley. But so attractive are these well-watered slopes and forest glades, that we agree with the writer that Persia should be encouraged to keep a firm hold on them, and so make up her mind, or be made to make up her mind, to hold them as a portion of her own dominions against all comers, whether Russians or Turkmans.

The strategical and political report with which the work closes contains nothing new, but its statistics have been carefully compiled, and its perusal will repay the student of Central Asian politics. We would only observe that where the author speaks, page 338, of a second road to Herat from Ashurada, *viâ* Kizzil-Arvat, Abiverd, and Sharuks he omits to mention where the pass is, or what it is like, by which the intervening mountain range would be crossed by an army, and which he, as we have shown above, traversed at a point further east by a pass at an altitude of 6300 feet, before he reached Kelat. It is to be regretted that neither of the travellers had acquired, before proceeding on this journey, any mastery over the Persian language. Had they done so, the text would not, we think, have been disfigured by such impossible names of villages in Persia as Boomahoo, to which we have already alluded, and Boohoo, a village said to have been passed between Mash-had and Kelat. The student of Central Asian geography has already sufficient difficulties presented him by the various spellings of the names of places in the trans-Caspian regions. These difficulties are indefinitely increased when, as has been done here, a traveller visits a comparatively untrodden country, writes a book, and prints a map in which names of places visited are habitually spelt differently to what they are in the text. It would surely not have been beyond the capabilities of the intelligent young engineer officer alluded to as G——, to have drawn up a map on a larger scale than that of the one given, comprising only the country travelled over between Mash-had and Astrabad, and on which the names of places visited, and of which accurate information had been obtained, might have been legibly printed after careful comparison with the text of the work. Such a map, with the altitudes actually taken, would have been of real value. The difficulties that had to be overcome in acquiring accurate information are conceivable, when we learn that the travellers were at first dependent on an Italian who spoke Turkish but not Persian, and with whom they conversed in French. Subsequently, at Tehran, a Persian servant was engaged who spoke English fairly. The style of the author may be judged from the extracts we have given. It is not scholarly, nor is it particularly lively. Having had the training of a Hussar, he can probably handle his sword better than he does his pen. He has a good eye for country, and he takes evident delight in the appearance of the hardy Kurdish horsemen met with in the course of his travels. Of the Turkman horses and of their marvellous staying powers, he treats with a fair knowledge of the subject.

As regards the sport enjoyed by the author and his companion, there is really very little to be said, as Persia generally appears to be one of the worst countries in the world for game. The moufflon is to be found in the mountainous districts of the country, but they are by no means numerous, and usually very difficult to stalk, from the nature of the ground. The writer describes them as "thoroughly of the deer tribe," with horns somewhat like those of a ram, only not so curved. The best shooting ground crossed by the travellers was the tract of country passed shortly before they came back on Sháhrúd, on the high road between the capital and Mash-had. Pheasants were seen and a great many partridges. Of larger game there were ibex and moufflon in the mountains, wild asses in the plains, and "splendid pigsticking" might be had, the author says, with proper arrangement. Bustard abound, and the author speaks of a large bird, red-brown with whitish wings, of which an immense number were seen, but of which the species was not recognized. A place called Sanghos, under some mountains about 8000 feet high, but which stand curiously detached, divided one from the other by passes only from 1000 to 2000 feet above the level of the plain, is pointed out as the best head-quarters for sport in the north of Persia. Plundering bands of Turkmans sometimes visit this region, but it is not their custom to attack travellers who are well armed, and who are likely to make a stout resistance to being carried off as slaves to the banks of the Oxus.

We presume this is the writer's first literary attempt in the way of narrative. So little being known of the country visited during the last few weeks of the journey, it is unfortunate that the work betrays haste and carelessness. Had a little more pains been taken with it, it is possible that the author, with a little help, might have made it more readable. Should he ever take pen in hand again to describe what he has seen, we would recommend him to put himself on an allowance of an epithet and an adverb of which he is too fond: "A beautiful military road," "A beautifully retired stream." Speaking of a gun, "it carried a ball beautifully," give but a faint idea of the frequent use of these words. In making these remarks we have no desire whatever to detract from the credit which is due to the author of *Clouds in the East* for having undertaken this journey, during which, although all was not accomplished that he had in view, he proved himself to be possessed of no ordinary amount of resolution and enterprise. We believe that he and his companion are among the first Englishmen who, in recent times, have travelled in Persia, east of the capital, entirely on their own resources, and independent of any assistance from the British Government.

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STATISTISCHE SKIZZE DES RUSSISCHEN REICHES. Von *P. Schwanebach und W. Vasenius*. St. Petersburg, 1876.

MR. ROTTGER, the present proprietor of Schmitzdorff's firm, and publisher of the well-known *Russische Revue*, deserves credit and encouragement in his efforts for placing within the reach of West-European readers a vast amount of valuable information bearing upon the history and geography of the Russian Empire. The little volume now before us abounds in useful and interesting information. It presents us with the most recent facts bearing upon the area, the population, the mining, agricultural and manufacturing industries, the commerce, navigation, finances, social, educational and criminal statistics of a vast empire, containing a population exceeding eighty-five millions of souls. If we bear in mind that statistical documents printed in Russian are intelligible only to a few amongst us, and are never presented in so compact a shape, the value of this 'Statistical sketch' will be duly appreciated.

DIE INSELN DES STILLEN OCEANS. Von *Dr. Carl E. Meinicke.* Leipzig (Frohberg), 1876.

THE first volume of this monograph of the Pacific has already been noticed by us. It is now completed by the publication of a second volume, which treats on Polynesia and Mikronesia. Dr. Meinicke has devoted many years of a long lifetime to a study of the Pacific world, and has succeeded in producing a work of sterling value, which may be referred to with confidence. There are numerous references to the authorities whom he has consulted, as well as a full index. Our only regret is that the work has not been furnished with a map, or rather a series of maps, giving the native names of the various islands, as well as the names bestowed upon them by their first discoverers. None more competent for this task could have been found than the author of this valuable work.

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INDISCH ALBUM. 250 Photografien in den Oost-Indischen Archipel naar de Natur. By *J. A. Meessen.* Amsterdam, J. H. Bussy. London, Trübner & Co.

AT the present moment, when the intercourse between Australia and China is daily increasing, and the ocean highways from India to Australia intersect the entire Archipelago, since the acquisition of the Fiji Islands, it has become a matter of great importance to secure the safety of its navigation. Above all, recent events will perhaps render it necessary for this country to form a Papuan settlement to suppress the recurrence of piracy and murder. M. Meessen's Album naturally devotes itself chiefly to the ethnology of the Javanese and of the aborigines of the adjacent Malayan islands, including the Sumatra, Sunda, and Borneo groups, &c. The native population of all these islands is kindred to the negro race, differing, however, from the African type by having long hair, growing in tufts, instead of being woolly like that of the latter. The views of the scenery, the *Landschappen*, are not so interesting, too large a portion of the photographs being devoted to Dutch public and private buildings; but, where they give the natural landscape, they are important as being far more accurate than the representations furnished in books of voyages and travel.

The cost of getting up this grand book of illustrations of the ethnology and topography of the East Indian Archipelago was upwards of 34,000 florins. Of the artist's careful manipulation and the extreme accuracy of the photographs, Dr. T. C. I. Mijnmalen, who calls the series "*een vorstelijk Geschenk*," has given a highly laudatory notice in the *Tijdschrift voor Neerlands Indie*, for February, 1874. The photographs are mounted on cardboard in royal folio, and inclosed in four cabinet cases to represent books on shelves, covered with cloth.

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BULLETINS DE LA SOCIÉTÉ DE GÉOGRAPHIE. September 1875—March 1876. Paris.

AMONG the articles in the Bulletins of the Paris Geographical Society which have appeared during the past half year, are many of great interest, and the following articles claim especial notice: On the upheavals and depressions which in the course of ages have taken place along the coast of France, by Jules Girard. A Journey in Abyssinia, to Zanzibar, and the Uanika country, by Achille Raffray.* An itinerary, by the Abbé Desgodins, from Yerkalo to Tseko, in Indo-China, which is illustrated by a sketch map, and throws a good deal of light on the topography of that country, where Burma, Tibet and Yunnan march together. Some short but interesting notes on Japan and the Russian possessions in the extreme East of Asia, by Lieutenant G. Baudens. An article on the basin of the Madeira River, by the Abbé Durand; an exhaustive description of the Tierra del Fuego, with map by G. Marguin. A list of routes between Tangiers and Mogador (with map) collected by M. Beaumier, of the French consular service; and, lastly, the Abbé Armand David's account of his journey in Western China (1868-1870) up the Yang-tse River, and by land to a place called Mupin, six or seven days' journey north of Ching-tu-fu in Sze-chuen.

* See Geographical Magazine for August 1875, p. 253.

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MARNO'S REPORTS FROM KORDOFAN (*Mittheilungen*), Vienna Geographical Society, 1875. Pp. 108, 172.

THE readers of the *Geographical Magazine* are aware that Marno, after his return from the Upper Nile, proposed to penetrate into Dar For, but that his intentions were frustrated by the opposition of certain persons in the employ of the Khedive. He was therefore compelled to restrict his researches to Kordofan, and the letters now before us, as well as the map which accompanies them, show that he has made good use of the time at his disposal. He has determined the geographical position of el Obeid, ascertained numerous altitudes, made meteorological observations, and carefully plotted his routes. His map contains much that is new to cartographers.

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BOLLETINO DELLA SOCIETA, Geografica Italiana; Ottobre-Décembre 1875. (Roma, 1876.)

AMONG the original articles in this number of the *Bolletino* of the Italian Geographical Society may be mentioned an account of the part played by Italy at the Paris Congress of 1875, by Signor Correnti; notes on the Italian Expedition to Tunis, by Captain O Baratieri; a Geological notice of fossil rizopods in the tertiary deposits of Rome, by Dr. G. Terrigi; and several interesting notes of a geographical character. One of these states that the height of Lake di Garda, which has been variously given by different authorities, has just been determined by Signor E. Mantegazza, an engineer, who carried five lines of levels to the margin of the lake, which proves to be 64.135 metres above the mean level of the Adriatic. Another note furnishes some information respecting the probable conditions of the Venda volcano, near Padua. The number concludes with notices of various Italian scientific works.

Cartography.

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IN 1874 the Congress of the United States appointed a committee to inquire into the surveys which were being carried on to the west of the Mississippi River, and to report whether it would not be advisable to place all these surveys under one department, or, at all events, to define the limits to be embraced by each, so as to avoid overlapping. The Report of this committee has been published,* and it appears from it that no less than three distinct departments had charge of these expeditions. The surveys of the Land Survey Office, as well as the "Geological and Geographical Survey of the United States Territories," under Professor F. V. Hayden, were carried on by authority of the Department of the Interior; Professor Powell's "Survey of the Colorado of the West" was being conducted under the supervision of the Smithsonian Institution, whilst Lieutenant Wheeler had charge of the Topographical Survey of the Western Territories, and Mr. King of a Geological Survey along the 40th parallel, the two latter being placed under the Engineers' Office of the War Department. The surveys of Mr. King and Professor Powell have been completed, the former extending over 81,600 square

* 43rd Congress, 1st Session, Report No. 612.

miles, the latter over 45,000 square miles, and there remain now practically in the field only the parties of Lieutenant Wheeler and Professor Hayden. It is admitted on both sides that the main share of the work is done by civilians, the officers attached to Lieutenant Wheeler's party limiting themselves to astronomical observation at field stations and "executive duties." Lieutenant Wheeler claims that there has always existed the greatest cordiality between the civilians and military officers placed under his orders, and contends that it would be to the public interest to place the whole of the surveys under the War Department. Professor Hayden, on the other side, maintains that a scientific person should be placed in charge of scientific work, that the presence of officers and military escorts with surveying parties proved merely a hindrance, and that all the surveys should be placed under the Department of the Interior. Both parties charge each other with performing their survey-work in an inefficient manner, and some of the statements made before the committee are certainly discreditable to the persons who made them. Fortunately we are not called upon to take a side in this controversy, and merely look to the results achieved. We do not expect these surveys to be as accurate as those carried on in European countries. The rapidity with which they are being made does not admit of this. As an instance, we may mention that Lieutenant Wheeler, with a staff averaging seven officers and topographers, surveyed no less than 218,150 square miles of rough mountain country in the course of six years, and that the cost, exclusive of the pay of the military officers attached to the party, barely exceeded one dollar a square mile. A large portion of the area surveyed was examined geologically at the same time by professional geologists attached to the survey parties, and valuable natural history collections were made. We are given to understand that the surveys are based upon a minute triangulation of the country, and are not mere traverse or "meandering" surveys, as have been contended. The position of several points has been fixed by most careful astronomical observations, and the altitudes are determined barometrically. The results of this survey will appear in an atlas of the whole of the United States, westward of the 100th meridian from Greenwich, of which the first part has just been published.* It contains an index map, showing likewise the routes of the principal military exploratory expeditions since Fremont, a sheet of conventional signs, a map of the areas of drainage, and eight sheets out of the total of ninety-two which will ultimately compose the atlas. They are drawn on a scale of one inch to eight miles, and a comparison of them with the best maps of the United States, or of portions of them published hitherto, shows that Lieut. Wheeler's surveys have added much to our geographical knowledge of the regions delineated. The features of the ground are shown effectively and characteristically, and the only feature which strikes us unpleasantly is the almost entire absence of altitudes, for which a promise to publish them in a separate shape hardly consoles us. They ought certainly to have been inserted upon the maps. An edition of this atlas, coloured geologically, is promised; and as Lieutenant Wheeler is careful to embody the work of his predecessors with his own, he will no doubt produce a map of the Great West which will meet general requirements for some time to come. The maps are produced by photo-lithography, and a grey tint imparts to them a certain elegance. They are certainly fine specimens of draughtsmanship, and a similar map of the countries to the east of the Mississippi would no doubt prove welcome in the present dearth of good and trustworthy American maps.

* *Topographical Atlas* projected to illustrate geographical explorations and surveys west of the 100th meridian of longitude, prosecuted in accordance with Acts of Congress, under the authority of Hon. W. W. Belknap, Secretary of War, and the direction of Gen. A. A. Humphreys, Chief of Engineers, U.S. Army, embracing results of the different expeditions under the command of Lieutenant Geo. M. Wheeler, Corps of Engineers. Washington, 1876. London (Trübner & Co.).

WE have received from Dr. G. Schweinfurth a MAP of the REGIONS of the UPPER NILE,* on a scale of 1:1,000,000, upon which E. Linant de Bellefond's route, as well as that of Chippendall's, have been laid down. The map contains much that is new. The capital of M'tse, which is called Dubaga—Stanley spoke of it as Ullagala—is placed in lat. 0° 29′ N., at a distance of about 7 miles from Murchison Bay. The "canal" indicated on Stanley's map, enters the head of Murchison Bay. Chippendall appears to have reached a point to the north of Murchison Falls, in lat. 2° 31′ N., but whether the Somerset River bifurcates below these falls, or discharges the whole of its waters into the Mwutan, cannot yet be said with certainty. That there is a connection between the Somerset, on the one hand, and between the Bahr el Gebel on the other, is hardly open to doubt. Dr. Schweinfurth has autographed his map, and though it may not be as fair to look upon as would have been the case had it passed through the hands of a skilled engraver, it is undoubtedly a valuable contribution to African geography, and intrinsic value, after all, in maps, as in other things, is the main thing to be considered.

BRUNTON'S MAP OF NIPPON (JAPAN).†—Mr. Brunton has resided for a number of years in Japan, employed upon the execution of public works. His occupation necessitated frequent journeys, and like many others in a similar position he felt the want of a trustworthy map. Japan is not in the same position as uncivilised and unexplored countries. Fairly correct maps of the provinces exist, as any one acquainted with Siebold's *Nippon* will know, and it only needed some one to bring together these native materials, to translate them, and to adjust them to the coast surveys made by the British Admiralty. The useful task has been accomplished by Mr. Brunton. His map is ready now for the engraver, and will prove a useful accession to our cartographic materials on Eastern Asia. The names have been spelt according to the method accepted by the British Legation at Tioko, that is to say phonetically, and there is not the slightest difficulty to pronounce them so as to be understood by the Japanese. The same could not be said of the Admiralty spelling, which defies every principle, in spite of the rules laid down for the guidance of officers.

IN 1861 M. Marcou published a geological map of the world, in the compilation of which he was guided by the principle of not indicating any geological formations, except where their existence had been established on trustworthy evidence, brought forward by trained geologists. Of this map a new and revised edition is now before us.‡ Eight geological formations are indicated upon it, viz., recent, tertiary, secondary, cretaceous, jurassic, triassic, dyassic, carboniferous, palæozoic, crystalline, and volcanic rocks. About two-thirds of the earth's surface still remain a blank, as far as our knowledge of their geology is concerned. We cannot help thinking that some of these blanks might have been filled up, had not the author been so

* Carte d'une reconnaissance faite par M. E. Linant de Bellefond's (Février-Juin 1875) entre Regaf et le lac d'Ukerewe, dressé par G. Schweinfurth, Cairo, 1876.

† A Map of Nippon (Japan), by H. Brunton, C.E., F.R.S. Scale 20 miles to the inch. MS.

‡ Geological Map of the World, by Jules Marcou. Constructed by J. M. Ziegler. Zürich (J. Wurster), 1875. London (Stanford). The map is on Mercator's projection. Size, 53 by 48 inches.

very rigid with reference to his authorities. He is quite right when he deplores the want of geological knowledge of most, or nearly all, our travellers, and particularly of those who have been most successful in exploring unknown regions. But surely no geological knowledge is required to distinguish most of the crystalline or volcanic rocks from sedimentary ones. We, for one, should not hesitate to accept Livingstone's statements with respect to the occurrence of basalt or granite in the interior of Africa, although his geological knowledge, properly so called, was of the most limited nature, apparently based upon the perusal of some elementary handbook. A knowledge of the geographical distribution of crystalline or volcanic rocks is certainly not sufficient for the construction of a geological map, but it is at all events a step towards it; and the indication of these rocks in Arabia, Africa, and elsewhere, where their existence is beyond doubt, would certainly have added to the value of the map. In some instances, too, M. Marcou has not embodied the labours of explorers who may fairly claim to be called geologists. Confining ourselves to Siberia, we thus miss an indication of the geology of the Thian-Shan, as determined by actual observation by Severtsof; and find no indication of the geological exploration of the country to the east of the Middle Yenisei, although a geological map of it has appeared in the *Memoirs of the Russian Geographical Society for* 1869. The geology of the Amur region, too, appears to have been inserted from descriptions, and not from the map published by F. Schmidt in 1868. Omissions such as these are, however, inevitable in a work of such magnitude,* and full credit should be given to the author for the industry with which he has collected materials from all corners of the world, and for the patient and intelligent care with which he has embodied this knowledge into a map. And he has done more than this. The memoir which accompanies his map offers far more than its title would lead us to expect. It is not a mere explanation of the map, but rather a critical history of geological exploration throughout the world. There is much in it that is new to geographers and geologists, and it will be read by both with interest and profit. The author's definitions of the English, German, and French schools of geology are particularly interesting, and his occasional onslaughts upon an English geologist now deceased, whose tyrannical and grasping spirit would suffer none to rise into notice, or to gain credit for their discoveries, will raise a smile to many a reader acquainted with the circumstances. M. Marcou's work is invaluable for purposes of reference, and its author is deserving the thanks of men of science for the patient labour he has bestowed upon it.

BEING on a geological subject we may notice the new edition of Dr. H. W. Bristow's Table of British Sedimentary and Fossiliferous Strata,† which has just been published, and contains a great amount of useful information in a compact form. The position of the author as director of the geological survey of England renders it a work of authority.

MR. R. BROUGH SMYTH, the director of the geological survey of Victoria, has just published a Geological Sketch-Map of the whole of Australia,‡ which embodies the results of all geological surveys and explorations up to the present time. The map is neatly printed in colours. Eleven geological formations are indicated. By far the greatest area is occupied by tertiary or cainozoic rocks (including pliocene, miocene, oligocene, and desert in sandstone). Next in importance are the granitic and the cretaceous rocks. A new edition of the Geological Map of Victoria, by the same author, has likewise been published.

MERENSKY'S MAP OF TRANS-VAAL* is a valuable contribution to the geography of South Africa. It is based, to a great extent, upon the surveys of the author, who has resided for many years in that Republic as Superintendent of the Berlin Missions.

E. G. RAVENSTEIN.

* Explication d'une seconde édition de la carte géologique de la terre. Par Jules Marcou. Folio, pp. 225. Zürich (Wurster & Co.), 1875. London (Stanford.)

† Table of British Sedimentary and Fossiliferous Strata. By H. W. Bristow, F.R.S. London (Stanford), 1876.

‡ First sketch of a Geological Map of Australia, by R. Brough Smyth. Scale, 1 : 7,000,000. Melbourne, 1875.

Correspondence.

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THE MASHOONA COUNTRY.

To the Editor of the "GEOGRAPHICAL MAGAZINE."

SIR,—I can endorse the description given by Lieutenant Cameron of part of "Central South Africa," from personal experience, having explored through the Mashoona country in the great bend of the Zambesi, between the Victoria Falls and the Indian Ocean.

In 1866 the chief Moseli Ratse gave Mr. James Gifford and myself "a path" into the Mashoona country. Mr. Gifford had been previously, with Sir Richard Glyn, up to the Victoria Falls.

The Mashoona country, we were told by the "great captains" of Moseli Ratse, to be full of large game. Our principal object was elephant-hunting; still, at the same time, our hearts were heated by the love of exploration natural to Englishmen. We tracked through some 250 miles of the Mashoona in the direction of Tête, the Portuguese settlement on the Zambesi, and found a country on an elevated plateau of undulating formation, full of streams and some fine rivers. Crystals, agates, and chalcedonies were found in the beds of most of the rivers. The soil was rich, producing the finest grasses; the timber was magnificent, and the climate healthy. We found elephants, rhinoceros (four kinds), hippopotami, lions, buffaloes, and all the larger sorts of antelope. Herr Carl Mauch, the geologist from Wurtemberg, accompanied us.

I discovered a small piece of chalcedony, a beautiful natural casket, clustered with five small gems, which Carl Mauch at once pronounced to be precious stones of perfect formation. The following year Carl Mauch discovered gold in the same country, which lies on the watershed of the rivers flowing into the Zambesi on the north, and the Limpopo on the south.

The Mashoona is thinly inhabited, the natives having been killed and driven away by the Matabela Moseli Ratse nation. The Mashoona are wonderful workers in iron. I saw very beautiful knives, in exquisitely carved sheaths, made by them, and have now in England some fine, heavy assagais of their workmanship. The iron ore in the country is very rich. Some specimens I found and gave to Herr Mauch; he told me they contained 90 per cent. of iron.

The Mashoona country could easily be reached up the Zambesi. Yours, &c.,

J. FENWICK WILKINSON, F.R.G.S.

April 30th, 1876.

* A. Merensky, original Map of the Trans-Vaal or South African Republic. Scale 1 : 1,850,000. *Zeitschrift für Erdkunde*, vol. x., part 5, 1875.

Log Book.

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The 'Pandora.'—Captain Allen Young, sailed from Cowes for Smith Sound, having on board the mails for the Arctic Expedition, on the 31st of May, with the hearty good wishes of all England, and the warm gratitude of the friends of our absent explorers. The 'Pandora' has received several improvements since her last cruise. A house has been built on the upper deck, containing the ward-room and captain's cabin, and another before the main-mast for the petty officers' mess. The cabins of the officers are still below, but the old ward-room now affords space for stowage, and the 'Pandora' has 130 tons of coal below, with a clean run fore and aft on the upper deck. The accommodation of the men has also been much improved.

The officers are Lieutenant Arbuthnot, R.N., Navigating Sub-Lieutenant Pirie, R.N., Lieutenant Becker, of the Austrian Navy, an admirable artist, Lieutenant Koolemans Beynen, of the Dutch Navy, Dr. Horner, and Mr. Grant, a photographer. We are glad to be able to announce that the Admiralty have granted full pay and time to Lieutenant Arbuthnot and Sub-Lieutenant Pirie during the cruise.

Survey of the East Siberian Coast.—A survey of the coast of Eastern Siberia between the parallels of 45° and 52° N., from Plastun Bay to Castries Bay, has just been completed by Lieutenant-Colonel Bolschef with the assistance of eleven surveyors. The undertaking was one of difficulty and involved great hardships, as there is no land-route along the coast, and navigation close inshore is often impossible, owing to the prevalence of fog and surf. Nevertheless, during the three summer months an instrumental survey of 3800 square versts, and a sketch survey of 757 square versts of coast was completed, the country being, with a few exceptions, an uniformly mountainous one. The range of Sikota Alin or Barin, which runs parallel to the coast, traverses the entire length of the region surveyed, and terminates in abrupt cliffs rising to the height of 800 feet. There are only two bays—Stark Bay, which is separated from the sea by a narrow tongue of land, and which offers good anchorage for vessels of small tonnage, and Mossolof Bay, which is protected from the north winds by three islets.

The country is watered by numerous streams, flowing through valleys about 10 versts wide, which, on account of their good soil, luxuriant vegetation, their proximity to the coast, and the productiveness of the fisheries there, offer exceptional advantages to colonists. Along the coast, but especially in the north, there is great quantity of timber, suited for shipbuilding, and in the same parts lead, silver, iron, copper, and coal have been found, and in the neighbourhood of Cape Zolotoi gold has been discovered. Though the whole coast-line is over 1000 versts, the population (which in the south is agricultural, while those in the north subsist by hunting and fishing) does not exceed 550,000. A good trade in furs is done by the Ussuri merchants, and the Chinese derive great profit therefrom, as sometimes they actually purchase ten sable skins for 100 needles! Other interesting information respecting this survey was given by Lieutenant-Colonel Bolschef at the last meeting of the Imperial Russian Geographical Society.

The Livingstone Mission on Lake Nyassa.—The party which left England in May, 1875, with the object of founding a mission station on Lake Nyassa, have, according to late advices received by the editor of the *Daily Telegraph*, reached Lake Nyassa by water. A good site has been obtained for the settlement, storehouses built, and a cruise taken round the Lake. It extends north to 9° 20′ S. lat., with a coast-line of not less than 800 miles, and an average depth of over 100 fathoms. At the north-east end a range of mountains extends along the lake for 100 miles, ranging in height from 10,000 to 12,000 feet. There are many islands, and numerous rivers, but none are navigable for any great distance. The slave trade is still carried on to an alarming extent; many parts of the country are depopulated, hundreds of human skeletons are met with, and as many as 15,000 to 20,000 slaves are annually transported. The Arab traders are in league with the chiefs on the south and west in capturing slaves further inland. With a small vessel and a dozen resolute Englishmen, Mr. Young is of opinion that the whole trade could be paralysed. All that would be required would be a few bales of calico and beads to buy up the ivory. By this means it would not pay the Arabs to march all round the lake for slaves alone. Dr. Stewart is expected shortly to join the expedition, and it is the intention of Mr. Young to hand him over the command and then return home.

Ascherson's Trip to the Little Oasis.—Dr. P. Ascherson left Benisuef for Medinet-el-Fayum, on the 16th of March, and started from the latter place on the 24th, *en route* for the Little Oasis, the botanical exploration of which constituted the object of his journey. On the 1st of April he reached Bauîti, the present capital of the Oasis parva, by the same route as that followed by Belzoni in 1816. This journey proved that no "Bahr bela ma" or old river-bed exists in that portion of the Libyan Desert. After an exhaustive exploration of the oasis, Dr. Ascherson started on the 1st of May on his return journey, travelling by an entirely new route, and reaching the Nile at Samalut. The botanical exploration of the oases of the Libyan Desert begun two years ago by Dr. Ascherson, whilst a member of Rholf's expedition, has thus been terminated, and several facts of great interest have been ascertained during this last journey as regards the Fayum, as well as the Little Oasis. Several species of plants, met with far to the east and south-west, in Asia, but not in the Valley of the Nile, or in the deserts to the east of it, occur also in the oases. Some of the more remarkable of these plants are *Dianthus Cyri*, *Populus euphratica* (= *P. diversifolia* of Mongolia) and *Prosopis Stephaniana*.

A Journey into the Arabian Desert of Egypt.—Drs. Schweinfurth and Güssfeldt have recently returned from an excursion to the ancient monasteries of San Antonios and St. Paul, in the desert to the east of the Nile. The former has paid attention chiefly to the geology and botany; the latter has made a route survey based upon astronomical observations. In our next number we shall publish an account of this interesting excursion.

Proceedings of Geographical Societies.

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THE ROYAL GEOGRAPHICAL SOCIETY.

Meeting of 8th May, 1876.

SIR HENRY RAWLINSON took the chair at 8.30 p.m. The papers read were, "On the Country and Natives of Port Moresby and Neighbourhood, New Guinea," by Mr. O. C. Stone, and "Natives and Products of the Fly River," by L. M. D'Albertis.

In his previous communication, which gave some account of his experiences in the Peninsula, Mr. Stone stated that owing to the great difficulty in procuring carriers or guides, he was unable to penetrate more than twenty-five miles inland. He now sends a more detailed account of his observations, regretting that in a geographical point of view it does not embrace so much of the Peninsula as he had hoped to have seen, and been able to describe.

In describing the geographical features, Mr. Stone writes that when they arrived at Anuapata, in October, 1875, the hills around presented a barren and parched-up appearance. They jut out into the sea in a succession of low conical mounds, averaging 400 feet in height, forming a range on either side of the harbour, and becoming higher the further they receded from it. The three villages of Anuapata, Tanapata, and Elevara, containing a population of nearly 700, are situated on the beach east of the harbour, at a distance of 2 miles from its opening; behind them extends a valley of the same length; while Mount Tapaharti, 750 feet high, closes it in. The sides of all these hills partake of the same barren nature, being partially covered by open forests of gum-trees (*Eucalypti*), averaging 8 or 10 yards apart, the intervening spaces growing coarse grass 6 or 8 feet high. These trees are alive with the songs of birds, among which parrots and doves are the most common. The whole country is broken up into hills, mountains, detached chains, and valleys; hence, for the first 20 miles, fairly fertile valleys and plains are not unfrequently met. As the interior is approached the land becomes more fertile, and after passing the River Laroki, 10 miles distant, numerous mountain-streams and watercourses cut it up in various directions. At the twentieth mile the character of the country is totally changed; the bird-of-paradise is seen, and the gum-trees and open country give way to dense forests of tropical vegetation, tall trees and undergrowth completely covering the northern ranges, excepting the upper part of Mount Owen Stanley, with an impenetrable mass of foliage. Nearing the great central backbone of the Peninsula, these heights increase to 4000 feet, and Mount Owen Stanley rises in a double peak to 13,205 feet. The most easterly of these peaks is called Bitoka, and the other Birika. Some 8 miles to the south, and nearly in a north-east direction, is the only discernible gap in this imposing range, whose average height is 8000 feet, and it is probably through this opening that the easiest way of crossing the Peninsula will be found. In the Vetura rivulet, so called by Mr. Stone from the name of the mountain from which it takes its source, brick-red and green rocks are most conspicuous. Mount Vetura is situated seventeen miles north-east of Port Moresby, and from its peculiar shape is an unfailing landmark. It forms the south-west point of the Vetura range, and rises to a height of 1200 feet. This range is about 2 miles wide and 8 to 10 in length, and includes the district of Munikaira and several villages. Upon the summit, at a height of 1600 feet, is a table-land, leaping from which is a cascade, which falls in one unbroken volume into the gorge that conducts its waters to the Vetura rivulet. This stream averages 15 yards wide, and when seen by Mr. Stone, in December, was 2 feet deep, with a current of three miles an hour. A valley separates the most northerly point of Mount Astrolabe from Vetura to its north, and through this winds the River Laroki, when it takes a turn northwards towards the high mountains. It is sometimes spoken of as Manumanu by the inland tribes, flowing westward, and falling into the sea at the village of that name, situated at the mouth of the Usborne, in Redscar Bay, which is no doubt one and the same river, or a branch of it. Mr. Stone was informed that another branch of the same river empties itself into the sea at Karo, a village to the south of Hood Point. The width, where they crossed it, nearly 30 miles in a direct line from its mouth, was 35 yards, depth 6 feet, and current 4 miles an hour, while its waters must remain fresh until within a comparatively short distance of the sea. A belt of trees on either side, some of whose trunks measure 4 feet in diameter and 100 feet high, marks its course. The Vetura rivulet, and several smaller streams flow into it, among which may be mentioned the Baikana, 6 miles from Anuapata, 14 feet wide and 3 deep. Many parts of the country are divided into districts, which vary in name from the villages they respectively contain.

Mr. Stone then goes on to describe the agricultural products of Port Moresby, which consist principally in bananas, yams, and taros, but on account of the inferiority of the soil many fail to bear, and none attain that perfection which is to be found in the interior. There, on account of the frequent rains among the mountains, the soil is very life-giving and nutritious, bananas growing luxuriantly, while sugar-cane, yams, taros, and sweet potatoes, attain an immense size. Breadfruit (*Gardenia edulis*), betel (*Arecu catechu*), mango (*Mangifera indica*), called yahi by the natives, and sago-palm (*Sagus Rumphii*), are indigenous. Tobacco is cultivated in the interior, and chilies, cucumbers, water-melons, vegetable-marrows, and small purple grapes, are also found. A rose-coloured stone-fruit, resembling an apple in form and taste, called *maita* by the natives, was plentiful. Wild oranges grew sparsely in the vicinity of Yule Island (Roro), and the nutmeg-tree (*Myristica fragrans*) was found to be abundant, more to the west, near the Fly river. By adopting the terrace system of irrigation, Mr. Stone is of opinion that rice would form an important item in her productions. In the open land the cotton-tree (*Bombax pentandrum*) is not uncommon, and the growth of the plant might be attended with satisfactory results. Cocoa-nut groves are usually found overshadowing the coast villages of the Peninsula, though insufficient for the requirements of the population, who partly subsist upon the fruit. In the neighbourhood of Hood Point, however, they are particularly plentiful; hence annual trading voyages are made by the natives of Hood Point to Anuapata, bringing cocoa-nuts from the south and sago from the north, which they chiefly exchange for earthenware pottery.

The people are of a lighter colour than those of the Fly river. In stature they are not so tall, but less warlike and more intelligent. The women take an active part in disturbances, and are more capable of making a hard bargain than the men. None of the tribes believe in a God, and are ready to attribute any extraordinary occurrence to supernatural agency.

The climate is relaxing, and most averse to the healing of sores. In the interior it is more salubrious; but it is impossible to live in the valleys without injury to the constitution, on account of the excessive moisture of the atmosphere.

The only mammals found are a species of kangaroo, the pig, dog, flying squirrel, bandicot, rat, opossum, and cuscus. Reptiles become more numerous as the low land to the west of the gulf is approached. Insects and land-shells are plentiful in the neighbourhood of Roro, but the latter scarcely exist in the vicinity of Anuapata, and the former are scarce. Birds are numerous. Flowers

are very scarce; but orchids, lilies, jasmine, hibiscus, and a few flowering trees are found here and there.

Mr. Stone concludes his interesting communication with a few words respecting the colonisation of this locality, which he thinks is well suited to Europeans.

M. D'Albertis's paper was next read, which gave somewhat similar details as to the country of the Fly river. This was followed by some notes of Dr. Mullens', in which he described his excursions in different parts of New Guinea, his ascent of the Ellengowan mountain, which was 500 feet above the sea, and the magnificent view obtained from its summit.

Sir HENRY RAWLINSON expressed the great pleasure with which he had listened to the reading of the two papers, and said that when some years ago the subject of New Guinea was brought on the *tapis*, he felt some doubt as to any great interest being taken by the Society, and he confessed that at that time he looked upon it as a *pièce de résistance*, which they might fall back upon when in need of some matter for discussion. At present merely the outskirts had been perforated, and it was generally agreed that we must gradually pierce into the interior. A Cameron of the future was needed, and he hoped that Mr. Young would be the coming explorer, and would force himself into the large and unknown regions of New Guinea.

Anniversary Meeting, May 22nd.

THE Meeting was held in the theatre of the London University in Burlington Gardens, under the presidency of Major-General Sir H. C. Rawlinson. The report stated that during the past year 266 ordinary members had been elected, of whom twenty-four paid their life compositions. The total net income for the financial year ended 31st December, 1875, had been £7934 15s. 6d., and the expenditure, exclusive of investments and balances, £5683 4s. 10d. The Royal (Founder's) Medal for the encouragement of geographical science and discovery had been awarded to Lieutenant V. L. Cameron, R.N., C.B., for his journey across Africa, from Zanzibar to Benguela, and his survey of the southern half of Lake Tanganyika. The Victoria or Patron's Medal was awarded to Mr. John Forrest, in recognition of the services to geography by his numerous successful explorations in Western Australia, and especially of his admirably executed route survey across the interior, from Murchison River to the line of the overland electric telegraph. The annual geographical medals offered by the Society to the chief public schools were awarded as follows: Physical Geography, Gold Medal, John Wilkie, Liverpool College; the Bronze Medal, Walter New, Dulwich College: Political Geography, Gold Medal, Thomas Knox, Haileybury College; and the Bronze Medal, W. M. H. Milner, Marlborough College.

The PRESIDENT then addressed Lieutenant Cameron, and said that he felt all the more pleasure in discharging his present duty, as he was in the chair when Lieutenant Cameron was sent forth on his important mission, and he had thus had the opportunity of watching his progress step by step. They were proud to think that Equatorial Africa had been traversed by a naval officer. They had selected him, however, as medallist, chiefly because he had, amid difficulties and dangers, in failing health, under privation and fatigue, steadily kept in view the permanent claim on his attention of scientific geography, and had thus brought back with him from the interior of Africa a register of observations for latitude, longitude, and elevation, which, for extent, variety, and, according to the Greenwich authorities, for judicious selection and accuracy of result, might favourably be compared with the finished work of a professional survey. They felt, therefore, that they might fairly hold him up as a model to future travellers, trusting that geographical science might as largely profit by the example which he had set to others, as by the results which he had himself contributed. He had presided on five occasions at the distribution of their annual awards, but he had never presented the medal to one who by his services had more thoroughly earned it.

Lieutenant CAMERON, in reply, said the hope of receiving the medal had sustained him during his journey. He knew he had not been sent to Africa to play, but to turn to account the training he had received in the service to which he was proud to belong. He was glad his work had been appreciated, and that the observations were accurate, and likely to be productive of good results.

The PRESIDENT then delivered the Patron's medal of the Society to Mr. Lowther, M.P., the Under-Secretary of State for the Colonies, who had undertaken, in the unavoidable absence of Lord Carnarvon, to transmit the medal to Mr. John Forrest. The President proceeded to remark that never, since the time of Stuart in 1868, had a journey been undertaken of the same magnitude and difficulty as that recently accomplished by Mr. Forrest and his party, between Champion Bay on the west coast and the Peake station on the line of the overland telegraph; and never certainly, either in Australia or in any other country, had a more conscientious and exhaustive survey been executed of the route traversed. The value of the medal would be much enhanced by its being thus officially transmitted to its destination.

Mr. LOWTHER expressed the pleasure he felt in accepting, on behalf of a colonist of one of their most important dependencies, the valuable distinction which had been awarded to him.

The other awards having been presented amid cheering, the PRESIDENT delivered his annual address on the geographical events of the past year.

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IMPERIAL RUSSIAN GEOGRAPHICAL SOCIETY.

8th April (27th March), 1876.—M. Rykatchef presented the report of the Meteorological Committee on Messrs. Weyprecht and Wilczek's scheme for Polar research. The committee recommended the establishment of two points of observation; one chief one at the mouth of the Lena, and the other in the island of New Siberia. The cost of starting and maintaining the two observing stations for two years would amount to 30,000 and 8000 roubles respectively, meteorological and magnetic observations constituting the chief part of the programme.

Colonel GILINSKY then gave an account of the operations which have been going on between 1873 and 1875, with the object of drying up the Pinsk marshes. The expedition entrusted with the examination of the region are of opinion that the accumulation of water is due to rainfall rather than springs. The land might be reclaimed by a double system of canals, parallel to the main course of the Pripet river, which would convey a portion of the water of its upper tributaries to those in its lower course, and so distribute the water more equally. The preliminary works have been started between Retchisa and Mozyr, and in the vicinity of Lake Sid, and an area of 50,000 deciatines (135,000 acres) has already been reclaimed, by means of 170 versts' length of canals. The cost has been 150,000 roubles. The drainage of the western half will be undertaken after consultation with the Department of Public Works and Communications.

Ordinary Monthly Meeting of the 14th (26th) April.

M. P. SEMENOF, Vice-President, in the chair.

M. WILSON, Secretary, announced that two expeditions to Asia would leave St. Petersburg in the course of the month. M. Potanin was about to make a journey into north-west Mongolia, and on the recommendation of the Minister of Finance, he would make special observations on the commerce of the country (a special sum of 3000 roubles having been sanctioned by Government

for this purpose), in addition to the geographical and ethnographical objects of his expedition. The Governor-General of Western Siberia had also lent his aid, by deputing a survey officer and two Cossacks to join the party. The second expedition was to be under the direction of Lieutenant-Colonel Prejevalsky, and is to explore the region between the Himalayas and the Tian-shan, and China and the Turkestan steppes, which is very imperfectly known. He will accordingly start from Kuldja, and travel by way of Hami to Lob-Nor, where he proposes to winter. He will explore the plains to the east, where wild camels and horses are supposed to exist, and record notes on the passage of birds; he will then proceed to Lhasa, and explore the upper course of the Brahmaputra, the northern slopes of the Himalayas, Eastern Tibet, and South-western China, and if circumstances permit, return to Russian territory by way of Western Tibet and Kashghar. The expedition will make geographical and ethnographical researches and a sketch route survey; it will determine the astronomical position of various places, take meteorological and other observations, besides making researches and collections in all branches of natural history, and taking photographic views. On the recommendation of the Finance Minister, the Emperor has sanctioned the sum of 24,740 roubles towards the scheme. Colonel Prejevalsky will be accompanied by Ensign Povalo-Schveikofsky, by M. Eklon, a volunteer, and seven Cossacks. While engaged in making his last preparations for the journey, Colonel Prejevalsky received the gold medal of the Paris Geographical Society, which had been awarded to him for his important discoveries. The first volume of his narrative, *A Journey into Mongolia and the Tangut Country*, has been and is being translated into various foreign languages, and the second volume is just on the eve of completion.

The last news from M. Miklukho Maklay are dated from Cheribon in Java, and he states that before leaving Batavia he despatched home several zoological collections, and that his anthropological and ethnological collections he would bring with him on his return to Europe in 1877. He inclosed drawings of types of the inhabitants of the Malay peninsula.

At the instance of General Kaznakof, who has represented that Western Siberia deserves more research than has hitherto been bestowed on it, a communication has been made to the Minister of the Interior, recommending the establishment of a new section of the Imperial Russian Geographical Society at Omsk.

Lieutenant-Colonel BOLSCHEF then gave an account of his travels along the coasts of the Sea of Japan and the Gulf of Tatary.

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PARIS GEOGRAPHICAL SOCIETY.

April 4th.—M. MALTE-BRUN in the chair. A report on the condition of the Danish settlements in Greenland during 1874-5, was read, from which it appears that much rain and snow fell during autumn and spring, but comparatively little in winter. Solid and compact fields of ice extended in the winter beyond Godthaab, on the south, for the first time in the memory of man, and only broke up in the beginning of April. The seal fisheries yielded a satisfactory result in the districts of Julianehaab and Umenak. The cod fisheries were productive throughout. Many whales were seen, but owing to the ice none were caught. Many ice-bears were killed (they travelled south with the ice) as well as some foxes and reindeer. The dog disease has spread now as far south as Jacobshavn. The total yield of blubber amounted to 12,629 tons. The native population in 1873 was 9513; in 1874, 9627 souls, including 4507 males and 5120 females. The cryolite mines at Ivigtot were worked by 146 labourers, and 634¼ cubic fathoms of mineral were exported.

A letter from M. S. DE BRAZZA was then communicated. That traveller disembarked at Lambarén, near the Ogowé mouth, on the 12th December last, and still remained there on the 12th of January. In the meantime he, as well as M. Marche and Dr. Ballay, had ascended the river as far as Sam Quita factory, and they had succeeded, with great trouble, in obtaining boats and boatmen.

A report on CAMERON'S journey across Africa was received with considerable applause.

The Abbé Durand read a letter received from P. DUPARQUET, a Catholic missionary, who had recently ascended the Congo as far as Boma, which he describes as quite European in its features, the natives having altogether retired from it to the neighbouring villages, which are populous. The Europeans of the fifteen factories existing at Boma acknowledge the sovereignty of eight negro kings, by whom they are guaranteed security of persons and property.

M. Bureau read a letter from M. ANDRE, who had despatched a large collection of natural history objects from Colombia. Amongst other localities he had visited the district of San Martin, to the east of Bogota, which he described as a botanical and mineralogical el Dorado.

M. LEVASSEUR exhibited a statistical school map of Europe, and insisted upon the importance of including a certain amount of statistical information in our geography lessons.

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General Meeting, April 19th, 1876.

Baron DE LA RONCIERE LE NOURY in the chair. The President opened the meeting with the usual discourse preliminary to the award of the annual prizes. The influence exercised by the Geographical Congress which met at Paris in August last had been most salutary, particularly as regarded their own Society. The number of their members, as well as their scientific collections, had increased largely, and the time was come when it was necessary to provide themselves with a *locale* better suited to their wants. The question was now being considered by the Central Commission, who would, no doubt, act with their usual prudence and success.

M. W. HUBER, Secretary of the "Commission des récompenses," then announced that a grand gold medal had been awarded to Dr. G. Nachtigal for his travels in Central Africa; a gold medal to Colonel Prejevalski for his journeys in Mongolia, and likewise a gold medal to M. Mariette Bey for his archæological discoveries in Egypt.

Dr. NACHTIGAL alone was present to receive the medal awarded him by the Society. He thanked the Society for the honour they had done him by placing him in the same rank with celebrated travellers who had received a similar reward, and should look upon his medal not as a reward for past services, but as an encouragement for future exertion. He was proud to have reduced to a small extent the vast blank which still disfigured our maps of Africa, and which, thanks to the labours of Cameron, of Stanley, and of the Italian explorers, would gradually disappear. Travels, such as those he had performed, enlarged the mind and the heart. They raised us above narrow-minded local patriotism, and enabled us to appreciate, at their true value, our fellow-creatures. In the centre of Africa, in the midst of savage tribes, he had no longer felt himself to be a German, but a representative of all civilised nations. In this character he had been thought worthy the reward which had just been bestowed upon him. It was the sincere wish of his heart that national rivalries would be limited to the domains of art, of science, and thought.

M. VICTOR GUERIN rendered an account of his exploration of the Jordan Valley, from the three sources of that river down to its embouchure into the Dead Sea.

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BORDEAUX GEOGRAPHICAL SOCIETY.

January 28th.—M. LANNELUC, Vice-President, in the chair. The Secretary announced the names of the teachers and scholars to whom the Society's medals had been awarded.

M. VASSENAT read a paper on "Storm Warnings" generally, and on the "Physical Observatory on the Summit of the Pic du Midi de Bigorre," in particular. The observatory has now existed for three years, and its advantages were undoubted. As an instance, he mentioned that on the 21st June the barometer there fell suddenly, and that thirty-six hours elapsed before this fall was noticed at the ordinary observatories. The establishment owed its existence to private persons, and its buildings were still of a temporary nature. General Nansouty, its director, carried on its work with military precision. There could be no doubt that an observatory of this kind was capable of furnishing far more valuable results than occasional balloon ascents, and he therefore hoped that means would be forthcoming for establishing it in a permanent manner.

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BERLIN GEOGRAPHICAL SOCIETY.

11th March.—DR. R. HARTMANN in the chair, Baron Richthofen being absent on account of the recent death of his brother. The chairman referred to Prof. Dove's Jubilee, and to the removal of Dr. Neumayer to Hamburg, where he would assume the direction of the newly established Nautical observatory. Dr. Dove had been intimately associated with the Society ever since 1830, and during many years he had filled the position of their President. The great services which he had rendered to physical geography and meteorology entitled him to their gratitude. Dr. Neumayer was a young member of the Society, but his sound knowledge and kindly spirit had gained him many friends and they saw him leave with regret.

The Chairman then introduced Count SECZENI, who was about to travel in High Asia, under circumstances which promised success.

Dr. R. KIEPERT read a paper on Cameron's journey across Africa, and Dr. REIN concluded his account of travels through Japan, the first part of which had been rendered in the February meeting.

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VIENNA GEOGRAPHICAL SOCIETY.

March 28th.—Dr. VON HOCHSTETTER in the chair. Crown Prince Rudolf, the Patron of the Society, attended the meeting. The President announced that Professor Dove had sent a letter of thanks for the felicitations which had been addressed to him by the Society, on the occasion of his doctor's jubilee. A letter on the circumnavigation of Borneo had been received from Captain Oesterreicher, of H.M.'s corvette 'Frederick,' and would be published in their *Mittheilungen*. A letter from Mr. Wiener, Secretary of the Austrian Legation at Paris, was read, which contained a few notes on the archæological researches of his brother, Professor Wiener, in South America, whither he had gone on a mission entrusted to him by the French Ministry of Education. He had first of all examined the Peruvian antiquities in the private collection of the Emperor of Brazil, and then made an excursion to the Island Santa Catharina, where he discovered bones and other objects buried beneath the shell heaps (sambaquis) which abounded there. This proved that these sambaquis marked places of burial.

A letter from M. Marno, dated Khartum, 30th January, 1876, was read, in which that traveller announced his approaching departure for Kairo.

Baron SCHEIGER-LERCHENFELD then read a paper on the topography of the country, along the proposed Syro-Mesopotamian Railway, and Colonel C. Muszynsky a paper on the regulation of the Sulina mouth of the Danube, and the changes which have taken place in its delta.

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DUTCH GEOGRAPHICAL SOCIETY.

Amsterdam, April 8th, 1876.

Professor P. J. VETH in the chair. M. KAN, the Secretary, read the annual report. The Society now numbered 720 members. A branch Society had been established at Enkhuizen. The consuls had been instructed by the Dutch Foreign Office to furnish geographical information on the countries in which they reside, and those at Melbourne and Algiers had already forwarded interesting reports. The geographical information obtained by the members of the Dutch expedition sent to Mauritius, to observe the transit of Venus, would appear in their proceedings. The proposed expedition to the interior of Sumatra would be placed under the command of Lieutenant J. Schouw Santwort, of the Navy, who would be accompanied by four men of science.

The meeting then proceeded to the election of forty-six honorary and fifty-three corresponding members. Amongst the former are Sir Henry Rawlinson, Clements R. Markham, Captain Nares, Lieutenant Cameron, Ney Elias, H. Stanley, and General Sabine; amongst the latter, Colonel Montgomerie, Colonel Thuillier, R. H. Major, Captain Burton, and E. G. Ravenstein.

M. F. DE BAS read a paper on the topographical surveys carried on in Java and Sumatra.

Professor D. D. VETH spoke on the Swiss map of Ticino, and the St. Gothard tunnel.

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EGYPTIAN GEOGRAPHICAL SOCIETY.

March 24th, 1876.—General STONE, Vice-President, in the chair (Dr. Schweinfurth, the President, being absent on an excursion to the Libyan desert).

M. DE COMPIEGNE, the Secretary, announced an accession of ten members, and read a list of donations received from other societies, and from private individuals. He also made a statement on the progress of geographical explorations in all parts of the world during the last month.

Signor BONOLA read a paper on *Italian Travellers*, insisting upon the great services which they had rendered to the cause of geographical exploration, particularly during the Middle Ages. Italy had cause to be proud of her discoverers, and in Africa in particular they had done good work.

M. DE COMPIEGNE gave a description of the kingdom of Ashanti, derived mainly from M. BONNAT'S accounts published in *l'Explorateur*.

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Census of British Isles, 1871.
LOCAL ELEMENT
OF POPULATION OF
COUNTIES & TOWNS.
Of the Persons living in each County or Town there were born in the County.
over 95 per cent.
85 95 .
75 85 .
65 75 .
55 65 .
45 55 .
less than 45 .
SHETLAND ISLANDS
ORKNEY IS
CHANNEL ISLANDS
Guernsey
Jersey
FRANCE
SUTHERLAND
CAITHNESS
ROSS & CROMARTY
INVERNESS
ELGIN
BANFF
ABERDEEN
FORFAR
PERTH
ARGYLL
KINROSS
CLACK
STIRLING
DUMBARTON
RENFREW
AYR
GLASGOW
EDINBURGH
HADDINGTON
BERWICK
LANARK
PEEBLES
SELKIRK
ROXBURGH
DUMFRIES
KIRKCUDBRIGHT
WIGTOWN
NORTHUMBERLAND
CUMBERLAND
DURHAM
WESTMORELAND
YORKSHIRE
I. OF MAN
LANCASHIRE
CHESHIRE
DENBIGH
FLINT
CARNARVON
MERIONETH
ANGLESEA
SALOP
STAFFORD
DERBY
NOTTS
LINCOLN
RUTLAND
LEICESTER
NORFOLK
MONTGOM.
RADNOR
HEREFORD
WORCESTER
WARWICK
NORTHAMPTON
HUNTS
CAMBRIDGE
SUFFOLK
ESSEX
HERTS
CARDIGAN
BRECON
GLOUCESTER
OXFORD
BUCKS
BERKS
MONMOUTH
CARMARTHEN
PEMBROKE
GLAMORGAN
WILTS
SURREY
KENT
HANTS
SOMERSET
DORSET
DEVON
CORNWALL
SUSSEX
IRELAND
DONEGAL
LONDONDERRY
ANTRIM
TYRONE
FERMANAGH
LEITRIM
SLIGO
MAYO
ARMAGH
MONAGHAN
CAVAN
LOUTH
DOWN
ROSCOMMON
LONGFORD
WESTMEATH
GALWAY
KING'S
QUEEN'S
KILDARE
WICKLOW
CLARE
CARLOW
LIMERICK
TIPPERARY
KILKENNY
WEXFORD
KERRY
WATERFORD
CORK
Belfast
Limavady
Dublin
Drogheda
Galway
Londonderry
Tarbert
Kilkenny
Waterford
Cork
Liverpool
Manchester
Leeds
Bradford
Sheffield
Hull
York
Lincoln
Chester
Derby
Nottingham
Boston
Norwich
Yarmouth
Leicester
Birmingham
Coventry
Cambridge
Ipswich
Colchester
Gloucester
Oxford
Bristol
Reading
Maidstone
Canterbury
Bath
Salisbury
Winchester
Southampton
Brighton
Portsmouth
Exeter
Dorchester
Plymouth
Newport
Swansea
Aberdeen
Inverness
Perth
Dundee
Arbroath
Montrose
Forfar
Kirkcaldy
Dunfermline
Stirling
Edinburgh
Glasgow
Greenock
Ayr
Hawick
Dumfries
Carlisle
Newcastle
Tynemouth
Shields
Sunderland
Durham
Middlesbrough
Barrow
Lancaster
Preston
Bolton
Halifax
Huddersfield
Manchester
Stockport
Macclesfield
Wrexham
Shrewsbury
Stafford
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